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MEDICAL ESSAYS

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AND

OBSERVATIONS.

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MEDICAL ESSAYS

AND

OBSERVATIONS

Published by A

of the Council and the Society of



VOLUME I

of the Society of Medicine

EDITED BY

London: W. A. H. & Co., 1841.
LONDON: W. A. H. & Co., 1841.

T O

Sir HANS SLOANE, Bart.

PRESIDENT;

AND

To the Council and Fellows of the
ROYAL SOCIETY of LONDON,
for improving Natural Know-
ledge:

Most and much Honoured,

THE glorious example given to
the world by the ROYAL SO-
CIETY, has made such an advan-
tageous change in Natural Know-
ledge since the middle of last cen-
tury, that the first fruits of all la-
bours of this kind become in ju-
stice due to the first and great pro-
moters of it.

iv DEDICATION.

THE just sense of this determines us to offer to your protection the following Sheets, designed to improve one branch of that extensive Science of Nature, which you cultivate with so much Honour to yourselves, and advantage to Mankind. We are,

GENTLEMEN,

Your most obedient, and

most humble Servants,

The COLLECTORS.

THE
P R E F A C E.

NO complaint is more general among those who apply to the study of any liberal science, than their being under a necessity of perusing such numbers of books as are wrote on the several parts of each of them: A labour that can have no end, since one book serves only as an introduction to another, while a few pages might contain all that is new or valuable in most of them. It must, however, be confessed that many good and useful remarks and discoveries are lost, by the unwillingness of some ingenious men to appear in print, and by others having neither time nor inclination to compose a sizeable treatise, who would communicate necessary and beneficial observations to the world, if they had a proper opportunity to do it in a sheet or two.

One probable method of remedying these two discouragements to learning is, to publish collections of small treatises, submitted to the examination

mination of a society of such who had particularly studied the science which is the subject of each tract; and who should give some short account of the most remarkable and useful discoveries and improvements made by the contemporary authors in their own profession: By which we would soon have more authors, and fewer books, to the great advancement of learning, and abridging of our studies.

There is no science in which there is more reason to complain of the abuses above mentioned than in Medicine, as evidently appears on viewing the catalogues of the *Scripta medica*: for, though the numbers and sizes of books are very great, how few of them are in esteem? and of these much the smaller share is wrote with a view to promote the principal part of medicine, the knowledge and cure of diseases, which chiefly depend on observations of facts that ought to be frequently repeated before any certain axiom in physic can be built on them; and of which there is such a variety as might afford an inexhaustible subject of observation, though there were no changes made at any time in the state of physic: But, from what we are certainly informed of in the history of this science, there seems to be a necessity, not only to study and improve the observations of those who went before us, but for the physicians of every age to collect others for their own use, and the advantage of their successors; since very often they cannot be assisted by any older writer, because several new diseases, unknown to our ancestors,
discover

discover themselves ; names both of diseases and drugs change, and are differently applied ; improvements and discoveries are daily made ; medicines at one time in the highest reputation are soon laid aside, and others are substituted in their place ; and the form and manner of using those still retained are perpetually diversified.

Physicians must be very sensible of these inconveniences, in reading the works of the first great improvers of medicine by observation, the Greeks ; nor are they less evident in the Arabians, who succeeded and copied after the Greeks : As we descend nearer to our own time, some of these difficulties are indeed gradually removed, though it is to be regretted, that the succession of different philosophies prevailing in the theory, has continued other difficulties in the practice of medicine.

Besides these general arguments for physicians continuing to make and communicate observations, we of the British dominions have particular reasons, more than some of our neighbours, to be employed this way, seeing we have been favoured with very few medical observations of our own ; and, on the other hand, our climate, way of living, and other circumstances, which ought to be greatly regarded in the cure of diseases, are very different from most inhabitants of the continent ; to which may be added, that every nation has its own prevailing mode of prescribing. On these accounts young practitioners

fers must be under the greatest difficulty to accommodate foreign observations, which they must have recourse to, to the constitutions of their countrymen, and to the then fashionable *formula* of medicines.

These reasons already mentioned, which are founded on the nature of the subject itself, ought certainly to incite us to obviate such difficulties; and the necessity of establishing physic on a better footing among us will still appear in a stronger light, upon taking a view of the different manners in which observations are handed down to us.

Those who publish volumes of their own practice, improvements, and discoveries, undertake a task very difficult to be executed as it ought, because of the qualifications necessary for it, which chiefly are Sagacity and Knowledge, to guard against errors and mistakes in the names and nature of things, and to distinguish between trite and trifling facts and such as are necessary to be remarked; Accuracy, to omit no essential circumstance; and Candour, to conceal nothing material. These are qualities not so frequently to be found all conjoined in one person; either nature has not been bountiful enough, or temptations are strong. Vanity and interest are powerful motives to make us magnify our own success, conceal our mistakes, and wish the world would believe us ignorant of no disease or its cure. Human nature is subject to such infirmities: And there have not been wanting critics,

tics, who have endeavoured to fix failures in some one or other of these articles on numbers of our modern observers: We wish we could justly exculpate them.

If we ought therefore to be cautious in giving an implicit credit to original authors, we must be no less on our guard in consulting the voluminous compilers, who indifferently collect from all books every case relating to the title of their sections or chapters.

Several collections of observations communicated to some considerable men by their correspondents have been published, and seemed to promise more accuracy and candour, by passing through the hands of a Censor equal to the task; but even in these we find plain marks of the publisher's too great complaisance, or of his fear to offend. The only collections of this kind that we know to be continued of late, are the *Acta Medica Berolinensia* and *Acta Wratislaviensia*; both these at least labour under the disadvantages common to all foreign observers. The first seems to be wholly composed by the publisher, without assistance, or very exact memoirs from any friends; and the second is in a language (the High-Dutch) very little understood by the British, and contains many papers foreign to the immediate improvement of physic. But, allowing these collections to be put on the best plan, it might be presumed that a society, of which every member has his particular task assigned him, to be executed behind the curtain,

tain, would be as free from a faulty complaisance or fear, and as capable of performing the work to advantage, as one gentleman who is engaged in private practice, and publicly known for the author.

The last method of communicating observations to the public, has been in collections made by societies; the most conspicuous of which are the *Royal Society* in London, the *Academie Royale des Sciences* at Paris, the *Academia Scientiarum Imperialis* at Petersburg, and the *Academia naturæ curiosorum* in Germany; all instituted by public authority, for the advancement of natural knowledge, under which the several branches of medicine are comprehended.

The *Philosophical Transactions*, and *Mémoires de Mathématique et de Physique* are valuable treasures, that public libraries cannot be without, and all learned men wish to possess, in the numerous volumes of which many parts of medicine have been treated with the utmost accuracy and ingenuity: But the constitution of the English Society and French Academy does not allow them to insert several things which a plan calculated only for the improvement of physic would easily admit; and it is to be regretted that their papers are not so universally purchased as they ought, by those who are employed in medicine, because the greater share of the tracts are not immediately relative to their proper business, but treat of natural history, mechanics, astronomy, abstract mathematics, &c.

The

The *Peterburgh Transactions* are yet of short standing, two volumes being only published, and are so much on the same plan with the former two, that we need not mention any further reasons why, in our opinion, a plan might be contrived that would be more generally perused by the students and practitioners of the different branches of physic.

The collections of the *Academia naturæ curiosorum* appear to be more calculated for the immediate improvement of medicine than any of the former; but, besides containing many papers of natural history and philosophy, and being liable to the inconveniencies of other foreign observations, they omit several necessary articles, which, in our opinion, ought to be taken in.

The remarks we have made on the different manner in which observations have been communicated, are by no means designed so much as to insinuate the uselessness of consulting such authors: On the contrary, none can be more sensible than we are of the advantages may be reaped from them by those who have knowledge enough to make a right use of them. All we would be understood to infer is, that the charges of some, and the mixture of other sciences with the medical papers, prevent their being so generally sought after; others are not calculated for our climate and practice; and some are to be read with caution: From all which we would conclude, that a collection of obser-

observations wholly relative to medicine, made in our own country, and candidly and accurately related, would be the most effectual way to improve physic among us.

Though we have hitherto principally insisted on the necessity of observation, as, in our opinion, the most essential part of Physic, we are not unmindful how much is still wanting to complete the *theory* of medicine, which we think would also be soonest and best done by small *Essays*, where an author having but a little field to cultivate, would certainly treat his subject with much more exactness, than when he lies under the necessity of writing up to the size of a book, where, either for the sake of two or three pages, he must repeat what has been said hundreds of times before him, or must undertake to discuss more subjects than either his genius, reading, study, or inclination would otherwise induce him to attempt.

The desire we have to remove the disadvantages which, in our opinion, medicine lies under on all these accounts, is the only motive that prevailed with us to undertake a yearly collection of Medical *Essays* and *Observations*, of which we now publish the first volume on the plan mentioned in our proposals, which we shall here present the reader with, that he may at one view be let into the whole design; and we earnestly beg to be acquainted by the learned gentlemen in physic, of what they think superfluous and deficient in our scheme, that
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The PREFACE.

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this work may be made as generally useful, as we most solemnly do declare we intend it.

It is proposed that each volume of MEDICAL OBSERVATIONS and ESSAYS, collected, revised, and published by a Society at Edinburgh, should contain,

I. A register of the height of the barometer, degrees of the thermometer and hygroscope, the quantity of rain that falls, the direction and force of the wind, and state of the weather at Edinburgh for twelve months, compared with observations of the same kind communicated by correspondents.

II. An account of the diseases which have been epidemic, or most universal in Edinburgh, in the several seasons of the preceeding year, with an extract from the records of burials; which shall also be compared with any accounts of the same nature sent from other places.

III. Observations and essays on the following subjects; 1. History of any part of physic. 2. Simple drugs. 3. Compound galenical medicines. 4. Chemical operations and experiments. 5. Anatomy. 6. Animal æconomy. 7. Theory. And 8. Practice of surgery and physic.

IV. Figures necessary to explain instruments, operations, descriptions, &c. in any of the foregoing tracts.

V. Discoveries or improvements made any where else in the several branches of medicine.

VOL. I.

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VI.

VI. An alphabetical index of the contents.

That the design and usefulness of this work may be more fully understood, we shall first consider the share of it which we undertake, and then shall give our opinion of the other parts with which we expect to be furnished by the learned gentlemen who shall please to favour us with their correspondence.

1. The Register of the Barometer, &c. will, we hope, not only be acceptable to all lovers of natural knowledge, but is absolutely necessary to be compared with the epidemical constitution, in order to determine a fact, concerning which two of the greatest and best observators in physic, Hippocrates and Sydenham, seem to differ; Hippocrates * appearing to assign the different manifest constitutions of the air, as the causes of epidemic diseases, and Sydenham † affirming such diseases to depend on some undiscovered quality of the air, and not upon any of the sensible changes in it.

2. Whatever relation may be found between the changes in our atmosphere and the epidemic diseases, all seem to agree, that there are certain circumstances and symptoms which distinguish the return of similar constitutions, and point out the most probable method of success in treating

* Epidemic. lib. 1. § 3. & ubique, De humor. p. 50. De natur. hominis, 227.

† De morb. acut. § 1. cap. 2. cui titul. de morb. epidem, p. 4. §. Schedul. monit. p. 486.

treating diseases while such constitutions prevail. The only way of discovering certainly these circumstances and symptoms, is a long continued series of observations, which we hope our work will supply.

3. We are to revise all the particular observations and essays transmitted to us, and to reduce them to the most convenient order, publishing each in the author's own words; only we beg to be excused, if we delay to insert any paper which appears to us deficient in facts, or not so methodical, till these circumstances, of which we shall inform the author, are cleared up. We do not however pretend by this power to reject observations, though some circumstances are omitted, if they are otherwise useful, nor to suppress essays that are ingenious, though the propositions they contain are contrary to our way of thinking. All we propose by reserving this choice of papers, is to acquaint the author of such omissions or objections as might be taken notice of, that, by supplying and correcting them, the work may be made more acceptable to the public; and therefore we persuade ourselves, that this part of our labour will prove one of the greatest encouragements to procure us correspondents.

4. We shall oversee the engraving of necessary figures, and shall return the originals, if demanded, as soon as the graving is finished.

5. We shall give a short account of the im-
b 2 prove-

provements and discoveries made any where else, that are of general use; to which shall be annexed a list of the medical books published during the currency of our year, with such as are proposed or promised to be soon printed; and any other piece of literary news that shall seem to conduce to the advancement of physic.

6. We shall take care to make the index full and compleat.

The manner in which each subject expected from our correspondents should be treated, is in our judgment:

1. In historical essays, the proper vouchers are to be particularly quoted.

2. The descriptions and virtues of simple drugs are to be clearly and succinctly told, without enlarging on arguments *a priori*, which are too liable to lead into error.

3. The proportions and method of preparing compound medicines are to be narrated, without concealing any ingredient, or the manner of using them.

4. Chemical experiments and preparations are to be fully described, as to ingredients, vessels, furnaces, degree of heat, time of operation, &c.

5. Ana-

5. Anatomical discoveries are to be accurately described, and the easiest method of searching out the discovered parts is to be related.

6. In all questions and disputes relating to the animal oeconomy, theory and practice of medicine, we desire all personal reflections and offensive terms may be shunned.

7. The histories of morbid cases, whether in physic or surgery, are to be related without any theoretical reasoning on the nature of the disease, &c. unless some particular circumstances require to be illustrated; which may be done by a short note at the foot of the page. It is therefore expected that such histories will only be a clear and succinct narrative of facts, in which the patients age, sex, constitution, former way of life, diseases to which they have been subject, or any other circumstances which serve to explain the present case, are to be remarked. If any manifest cause of a disease has been known, it is to be mentioned. All the symptoms, with the state of the pulse, appetite, thirst, sweat, urine, foeces, &c. are to be set down; and the sequel is to be an exact account of the symptoms, medicines prescribed, their evident effects, and of the event, whether into health, some other disease, or death. If the patient died, and a dissection was allowed, the parts preternaturally affected in their situation, texture, &c. are to be described.

Unsuccessful cases, or even mistakes in the nature of the disease, or in the practice, when known,

do very often more service to practisers in medicine, than several successful cases, since they are so many warnings from falling into the same mistake: We therefore beg our correspondents to acquaint us of such, if they should happen, declaring we will not publish such accounts, unless they are sent by the physician or surgeon immediately concerned; and that we will, if desired, suppress the name of any gentleman who has candour and honesty enough to acknowledge his mistake, and to make the world wiser in an uncommon way.

8. There is no more desired than an open full detail of the improvements in either physick or surgery.

9. Where two or more physicians or surgeons are employed in treating the same patient, or in making the same experiment, it is to be wished they would write the case or account of the experiment conjunctly, or at least that he who relates it would do it with all fairness and ingenuity, without discovering partiality for his own opinion, or disputing against the sentiments of others.

10. Seeing we propose, when there is occasion, to send our correspondents remarks on their papers, it will be necessary that each gentleman should write his name, designation, and full address in the papers he designs to transmit to us.

11. The language wherein it will be most acceptable to us to have the observations and essays wrote,

wrote, is English, in which the whole work is designed to be published, not without some regret on our part ; because we, and probably some of our correspondents, might have been more certain not to transgress at least in Latin rules of grammar : But several obvious enough and more forcible reasons dissuaded us from this language; and tho' we may not write pure English, which cannot be expected from our country, yet we would willingly hope we may be able to express ourselves intelligibly, which is the principal thing in a work of this kind, where elegance of style cannot be expected, and wit would be hurtful. If the learned world shall ever think our collections deserve to be more generally understood, we are willing to contribute all in our power to their appearing in a more universal language.

Besides what is proposed by the general scheme, we have inserted into this first volume a description of Edinburgh; and of the instruments where-with the meteorological observations were made. The first is done only with a medical view, that is, we have remarked the situation and other particulars of Edinburgh, which we think can influence the state of the air, or occasion diseases; and the mechanism, situation, &c. of each instrument are necessary to be known, that the observations may be compared with others. We beg all our correspondents to premise such descriptions also to their accounts of the state of the air, and epidemic diseases, without which comparisons cannot be made.

We

We have also published here the full register of daily observations made with the Barometer, &c. that we might shew the method used by us, and we desire the opinion of the curious learned, whether we ought, in the succeeding volumes, to continue this register in the same form, or if we ought to abridge it as it is done by the French Academy.

We chuse to begin our register, &c. of our medical year with the month of June, because then the vernal diseases are wore out, and a new constitution is not begun; whereas if we had followed the example of most other societies, by beginning with January, we must have broke in upon the middle of the most violent epidemic diseases that happen in this place.

We cannot conclude without returning thanks to the gentlemen who have furnished the materials for this first volume, and must presume, that their example, and this convincing proof of our being in good earnest to execute our proposals, will soon encrease our correspondence. We are persuaded our work will be acceptable to the public, if the papers transmitted to us hereafter are as useful and ingenious as those we now publish.

We must likewise ask pardon of some gentlemen whose papers we have been obliged to reserve till next volume is published, lest we should have made this too bulky. Our only rule in the choice of papers at present has been to withdraw those that

The P R E F A C E. xxi

that were sent us by correspondents, from whom we had received others that are here published; which we thought the surest way of shewing as equal a regard for all, as the plan, to which we had resolved to restrict ourselves, would allow.

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MEDICAL

ESSAYS

AND

OBSERVATIONS.

ARTICLE I.

The Description of EDINBURGH.

THE City of EDINBURGH is placed in
 3 degrees of longitude west from Lon-
 don, and in 55° 55' of northern lati-
 tude, is about a mile long, and, in several parts,
 near half as broad. It stands chiefly on the ridge
 of a hill, which, at its lowest part, the Palace
 of Holy Rood House, is 94 feet higher than the
 level of the sea, and gradually ascends from
 thence, in a direction betwixt the points W. by

2 MEDICAL ESSAYS

S. and W. S. W. to its highest part, the Castle-Hill; the perpendicular height of this ascent being 180 feet. All this ridge of a hill is one large fine street, which is divided near the middle by cross building, and a gate, (the Netherbow). The upper division is properly the city, and commonly is called the High-Town, and the lower half is named the Canongate.

The lanes (closes) going off from the high-street, are narrow and steep, especially those of the north-side, on which side the houses are not continued down to the foot of the hill, but on the brow there are gardens between the buildings and the fresh water lake (the Nore-Loch). On the side of this loch nearest the town, the butchers have their slaughter houses, and the tanners and skimmers their pits. Several lanes (the wynds) on the south-side of the street are larger, and not so steep as the others above mentioned, are built on both sides, and terminate in a narrow street (the Cowgate) that runs parallel every where with the high-street. It is a common tradition that this low part of the town was formerly a loch, in regard of which the one now remaining on the opposite side of the city was called Nore-Loch; and there are now plenty of springs every where in the Cowgate; and, after violent rains, the water makes its way, in great quantities, through the floors of the ground storeys there. From the Cowgate, other lanes are continued southwards to the city-wall; which is built on another ridge, almost parallel to the High-street: Where these lanes are not, there are gardens, burying places, &c. within the wall; and

and beyond it, from the gates, are some large suburbs.

Between the low street or Cowgate and this south-wall, most of the brewers have their work-houses, for the convenience of water.

The Canongate or lower part of the town, the larger share of which is properly without the liberties of the city, has narrow lanes going off from each side of the street; but, the houses not being built far down, there is considerable space for gardens, that are all planted and laboured.

The houses in Edinburgh are of stone, and are allowed by law to be five storeys high to the street, but are generally higher backwards. They are built very close on each other; and one stair often serves two houses, each of which contains a family in every storey; the height of the houses, narrowness of the lanes, and number of people entering by one stair, may therefore in some measure apologize for neither stairs nor lanes being so clean as in some other places where such crowds are not confined to such a narrow spot of ground.

No river nor rivulet runs through the town, or nearer it than three-fourths of a mile; but the city is plentifully provided with fine spring water, conveyed about three miles through leaden pipes. The markets are here plentifully furnished with flesh, fishes, fruits, herbs and roots. The common draught is small ale sold at two-pence a pint, which is about $4\frac{1}{2}$ pounds apothecary-measure, the people of fashion having plenty of claret, and all other sorts of wines. All except the poorer labourers use wheat-bread;

these indeed feed much on oat-meal: And all forts burn pit-coal in their fires.

The number of inhabitants in Edinburgh and Canongate is reckoned to amount to some hundreds more than thirty two thousand, allowing the number of those that die to be one thirtieth of the whole, or estimating every family to consist of five persons; this we judge to be rather too small a calcul for such a crowded healthy place as this is.

This cursory view of the city itself is sufficient for our purpose; and therefore we shall next consider its neighbourhood.

At the upper end of the High-street there is a large piece of waste ground (the Castle-hill), at the west-end of which, the Castle is raised on a very high rock, and commands the whole town. The Nore-loch begins on the north-side of the foot of the castle-rock, and is continued at the foot of the ridge on which the town stands, for about three-fourths of the high-street, being at its westmost half 300 feet broad, and only 250 in its lower half. The ground on the north-side of this loch is not so high as that on which the town stands. The Canongate is over topp'd on its north-side by a contiguous craggy hill (the Calton Craigs). Beyond the lowest extremity of the Canongate, a sloping plain runs eastward to the sea; but, to the south of Holy-rood-house, two very high hills (Arthur's Seat and Salzberry Craigs) are at a very little distance. The ground to the south of the Canongate is rather higher than the houses there; but the ground to the south of the High-Town is much in a level with it, and has considerable suburbs built on it; and towards the Castle.

Castle-hill the High-street is much higher than any place at a mile's distance.

Thus we see the castle higher than the town between W. S. W. and W. by S. The Calton Craigs is interposed between some part of the town and the N. E. winds, and protects the Canongate on the north; Arthur's Seat and Salzberry Craigs are a defence from the E. and the south-side of the Canongate and Cowgate are defended by their low situation: While the High-Town is open from the west to the N. E. point, and from the W. S. W. to the E. S. E. and all parts of the town are open to the winds between N. E. and E.

At two miles distance from Edinburgh, westward, are the Corstorphin hills, somewhat higher than the city. At a mile's distance from the middle and lower part of Edinburgh, where the town of Leith is built, is the Frith of Forth, which is a branch of the German Ocean that begins to be land-lock'd at twenty miles E. N. E. distance, and gradually becomes narrower to the place just now mentioned, where it is commonly said to be seven miles in breadth, but it is only about five; and then the shore advancing northward, while the town is turned southward, the distance between the town and Frith is gradually increased. The Frith is still more and more straitened, till it is named the River of Forth. The tide however rises at some more than twenty miles distance from Edinburgh.

Ten miles south from Edinburgh are very high hills (Soutry hills) extended from west eastward; and at two miles distance on the south of the high town are two hills (Blackford and Braid) higher

higher than any part of the town. And five miles south, the great range of Pentland Hills, which are extended many miles S. W. take their beginning; betwixt which and Corstorphin hills, with some others beyond these, a fine spacious plain is extended for a great many miles westward from the castle, and is watered with several rivulets.

II. *A Description of the INSTRUMENTS with which the Observations in the Meteorological Register were made.*

THE Barometer is a simple portable one, the tube of which is about a fourth of an inch diameter in its bore, and has a proportional large cistern for the stagnant mercury. It is kept in a chamber at the height of 270 feet above the level of the sea, as we calculated, by carrying this instrument to the sea shore, when the mercury was perfectly stationary; and allowing, according to Dr Halley's computation, (confirmed by experiments we tried), 90 feet perpendicular height for every tenth of an inch, which the mercury rose in the barometer, as we descended.

The different heights of the mercury in the tube at the several times of observation are marked in the register by inches and tenths of inches British measure, which we have also made use of in determining the degrees of the thermometer and hygroscope.

The Thermometer used in our observations, is the common glass-ball and small tube, containing

AND OBSERVATIONS. 7

containing colour'd alcohol, and sealed hermetically at the top. The freezing point is at 8 inches, 2 tenths; and the heat of a man in health raises the spirits to 22 inches, 2 tenths.

Our Hygroscope is a whip-cord with a plummet appended, which we have endeavour'd to make more capable of being compared with other such instruments, than is commonly practised, by ascertaining two fixed points in the following manner. We kept the cord very near to a constant fire for several weeks, and afterwards put it into a warm oven till it was so dry that we could scarce make it straight without breaking; then, having put the end of it through the nose of a funnel, to be secured within the funnel, by the iron pin on which it was afterwards to be hanged, we stuffed the nose of the funnel with sponge, and poured water into the funnel to trickle down along the cord. We supplied new water constantly, till the plummet would neither turn round, nor rise any more with the water which the cord received in this way, nor by soaking it in water nor by steams of hot water, but began to untwist as soon as we forbore supplying the steams or water. This operation we repeated four times, and always found that the difference in the length of our cord, when fully dried, to its length when fully wet, was four $\frac{1}{2}$ inches. The point of greatest dryness on the scale from which this article of the register is taken, is at five tenths of an inch, and the point of the fullest wetness is five inches.

We

We must likewise remark, that the Thermometer and hygroscope are kept in a square wainscot box, placed on the west-side and without the fash of a north window of the same chamber where the barometer is. The box is very tight on every side, when the door of it is shut, except in the side next the fash, where a great many large holes are made. By the situation and make of this box, neither the sun, or rain, nor the fire and company in the chamber, can have any bad effect on the instruments within it, and the air has open free access to them.

The direction of the wind is observed by the weather-cock of the high steeple of St. Giles's Church, which is the only tolerable place or instrument for making this sort of observation, in a city situated as ours is.

We were resolved to have determined the force of the wind very exactly, and for that purpose had contrived two instruments, one of which should shew the force at the time when the observations with the other instruments were made; and the second should have pointed the greatest force the wind had, between the times of observation. But, not finding any place for setting them up, where the wind could have its full effect, and the observator could have easy access, we laid aside that design, and have followed Dr Juryn's directions of judging by our senses, without the help of any machine, and, in the tables, have marked the several degrees thus, 0, 1, 2, 3, 4. By 0 is denoted a perfect calm; by 1, such a small wind as scarce moved the leaves of trees; by 4, a hurricane; and by 2, 3, intermediate forces.

The

AND OBSERVATIONS. 9

The instrument by which we have determined the depth of rain that falls, is, 1. A funnel of 28 inches diameter at its brim, placed at the top of a garden-wall, about the middle height of the city, and free from all over-topping houses or trees; and, to prevent evaporation as much as possible, a large share of the body and the nose of the funnel are sunk into a large very thick box of wood in which a narrow-neck'd receiver is placed, that allows the end of the nose of the funnel to enter it. 2. The gage in which the water is measured, is a cylindrical glass, whose diameter is exactly 2. 8 inches, or one tenth of the diameter of the funnel, and has its divisions into inches, and tenths of inches, exactly marked on its length with a diamond. The difference of the diameters of the funnel and of the gage readily shows, that one hundred part of what is measured in the gage, is only to be reckoned as the true quantity that falls, which we have set down in inches and decimals of inches.

III. *The*

III. *The Meteorological REGISTER.*

AFTER what has been remarked in the preceding account of the instruments, there is very little more necessary to be explained, in order to understand the following register; for we expect it will be readily known, that we always use the Julian or old style in determining the months and days of our observations; and the letters on top of the columns will easily explain what is contained in each. Nor is it difficult to follow out in the same continued line every observation that was made at the different hours of the forenoon, (a. m.) or afternoon (p. m.) set down in the second column. In the column under wind, the point from which it blowed is marked by the initial letters of its common name in the compass, and its force is determined by the cyphers. The appearance of the sky is told in the column of weather; and, where the pricked lines are carried out to the last column, the receiver of the rain was examined, but no water was found.

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JUNE 1731.

D.	Hour.	Baro. In. D.	Ther. In. D.	Hyg. D. I. D.	Wind. Dir. For.	Weather.	Rain. In D.	
1	9 a m	30	115	61	8	S W by S 1	fair	—
	5 p m	30	116	01	6	S W by S 0	cloudy	—
2	9 a m	29	915	31	7	S W	1	cloudy
	5 p m	29	915	91	7	W	2	cloudy
3	10 a m	30	014	42	1	W	1	cloudy
	4 p m	30	014	02	3	N W	1	rain
4	9 a m	29	912	21	7	N W	2	cloudy
	5 p m	30	013	01	5	N W	2	cloudy
5	9 a m	30	010	61	9	N W by N 2	hail	0.063
	4 p m	30	012	71	6	N	1	cloudy
6	8 a m	30	012	42	1	N W	1	cloudy
	4 p m	30	013	71	8	N W	1	cloudy
7	9 a m	30	012	22	3	N E	1	cloudy
	5 p m	30	012	72	0	N E	1	fair
8	9 a m	30	013	52	4	W	1	cloudy
	5 p m	30	015	21	7	W by N	1	cloudy
9	7 a m	30	013	21	9	W	1	cloudy
	5 p m	29	915	02	0	W	0	cloudy
10	7 a m	29	713	31	8	W	0	cloudy
	5 p m	29	613	82	1	W	0	rain
11	12 a m	29	514	41	8	W	1	cloudy
	7 p m	29	613	82	0	W	1	cloudy
12	9 a m	29	813	32	3	N E	1	cloudy
	6 p m	29	812	92	5	N E	1	cloudy
13	10 a m	29	713	02	6	N E	1	cloudy
	4 p m	29	713	21	4	N E	1	cloudy
14	8 a m	29	812	24	9	N E	1	cloudy
	5 p m	29	813	12	6	N E	1	fair
15	10 a m	29	814	41	2	N by W	1	fair
	5 p m	29	913	51	5	N by E	1	cloudy
16	9 a m	29	912	23	2	N E	1	cloudy
	4 p m	30	012	93	0	E by N	1	hazy

0.206

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JUNE 1731.

D.	Hour.	Baro. In D.	Ther. In D.	Hyg. I. D.	Wind. Dir. For.	Weather.	Rain.
17	9 a m	30	0 12	0 2	9 E	1 cloudy	0,106
	4 p m	30	0 12	3 8	8 E	1 cloudy	0,002
18	9 a m	30	0 11	5 3	1 E	1 cloudy	0,002
	5 p m	29	9 12	7 1	5 E	1 fair	—
19	9 a m	29	8 12	7 1	5 E by N	1 fog	—
	5 p m	29	4 12	8 2	8 E by N	1 fog	—
20	9 a m	29	3 12	3 3	3 E by N	1 fog	0,064
	6 p m	29	5 12	6 1	6 E by N	1 cloudy	—
21	8 a m	29	4 11	3 2	2 N by W	1 cloudy	0,075
	4 p m	29	4 13	5 1	5 N by W	1 cloudy	—
22	8 a m	29	5 12	0 1	5 N W	2 cloudy	—
	5 p m	29	5 13	8 1	2 N W	1 cloudy	—
23	9 a m	29	5 12	1 2	0 S E	1 rain	0,185
	5 p m	29	5 12	3 0	0 E by N	1 rain	—
24	9 a m	29	5 13	7 1	8 E by N	2 fog	0,176
	4 p m	29	4 14	6 1	9 S W	2 cloudy	—
25	8 a m	29	2 13	9 2	0 S	2 cloudy	0,255
	7 p m	29	1 14	1 1	8 S	2 rain	—
26	9 a m	29	5 13	5 2	0 W	0 cloudy	0,00
	3 p m	29	6 13	3 0	0 W	1 fair	—
27	9 a m	29	6 11	1 3	2 N E	1 rain	—
	4 p m	29	6 11	4 3	7 N E	2 rain	—
28	9 a m	29	5 11	4 3	7 W	1 fog	1,060
	5 p m	29	6 12	4 3	3 W	1 fog	—
29	9 a m	29	6 13	0 3	0 W	1 cloudy	0,020
	4 p m	29	7 13	8 2	8 W	2 cloudy	—
30	9 a m	29	7 14	0 1	1 W	2 fair	—
	5 p m	29	7 14	0 1	7 W	3 fair	—
Total depth 2,057							
H. at a med		29	5 13	2 3	3		
Gr. height 30		1	16	3	7		
H. height 29		1	10	6	1 2		

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JULY 1731.

Rain.	D. Hour.	Baro.	Ther.	Hyg.	Wind.	Weather.	Rain.
		In. D.	In. D.	I. D.	Dir. For.		In D.
0,106	19 a m 29	9 13	71	7	W	1 fair	—
0,002	6 p m 29	9 13	61	7	W by N	1 fair	—
0,002	210 a m 30	0 13	41	1	N	1 fair	—
—	5 p m 30	0 14	31	8	N by E	1 fair	—
—	38 a m 30	0 13	91	8	N by W	1 fair	—
0,064	8 p m 30	0 13	21	4	W	1 fair	—
0,075	49 a m 30	0 14	61	6	W by N	1 fair	—
—	5 p m 30	0 16	21	2	W by N	1 fair	—
0,185	59 a m 29	9 15	21	4	W	1 fair	—
—	5 p m 29	8 15	61	6	N E	1 fair	—
0,176	69 a m 29	8 13	41	5	N E	1 fair	—
0,255	8 p m 29	8 13	41	4	N E	1 cloudy	—
0,000	79 a m 29	8 13	33	0	N E	1 fog	—
—	4 p m 29	8 14	52	2	E	1 fair	—
1,060	89 a m 29	8 14	32	2	N E	1 fair	—
0,020	5 p m 29	9 14	92	0	N E	1 fog	—
—	99 a m 29	9 14	22	1	E	0 fair	0,016
—	109 a m 30	0 14	11	8	W	2 fair	—
—	4 p m 30	0 13	51	5	W	3 fair	—
—	119 a m 29	9 13	91	6	W	2 fair	—
—	5 p m 29	9 14	91	4	W	2 fair	—
—	128 a m 29	9 13	81	8	W	2 fair	—
—	8 p m 29	8 14	61	3	W	1 fair	—
—	239 a m 29	8 14	21	8	W	1 rain	0,012
—	4 p m 29	7 14	31	6	N by E	1 fair	—
—	149 a m 29	7 13	61	4	N E	0 rain	0,243
—	5 p m 29	7 14	51	7	N	1 cloudy	—
—	158 a m 29	6 13	51	9	W	0 rain	0,080
—	6 p m 29	6 14	51	3	W	1 fair	—
—	169 a m 29	6 13	41	6	N W	1 cloudy	—
—	5 p m 29	7 14	11	4	N by E	0 cloudy	—
—	79 a m 29	7 13	11	4	E by N	1 fair	—

0,352

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JULY 1731.

D.	Hour.	Baro. In D.	Ther. In D.	Hyg. I. D.	Wind. Dir. For.	Weather.	Rain.	
	5 p m	29	713	71	2	N E	1 cloudy	0,351
18	10 a m	29	812	61	4	N E	1 fair	0,017
	4 p m	29	914	01	2	N E	1 fair	
19	9 a m	29	913	31	5	W by S	1 fair	
	6 p m	29	815	21	1	W	1 fair	
20	9 a m	29	714	21	4	S by W	1 cloudy	
	5 p m	29	614	61	3	S	1 rain	
21	9 a m	29	414	91	8	S by W	1 cloudy	0,143
	5 p m	29	415	31	3	W by S	1 cloudy	
22	9 a m	29	514	11	6	W	1 cloudy	0,007
	6 p m	29	515	81	2	S W	1 fair	
23	9 a m	29	514	61	8	S	1 rain	0,155
	6 p m	29	515	71	5	S	0 cloudy	
24	9 a m	29	613	71	9	W	1 cloudy	
	5 p m	29	615	01	2	W	1 fair	
25	9 a m	29	614	61	7	N	1 cloudy	0,147
	4 p m	29	615	00	9	N	0 fair	
26	9 a m	29	713	41	5	W	1 fair	
	4 p m	29	815	00	9	W	1 fair	
27	9 a m	29	814	21	3	S W	0 cloudy	
	5 p m	29	715	01	8	W	1 cloudy	0,143
28	9 a m	29	715	21	9	W	1 cloudy	0,010
	7 p m	29	815	01	4	S	2 cloudy	
29	9 a m	29	815	71	4	S by W	1 cloudy	
	5 p m	29	815	11	1	S by W	1 cloudy	
30	9 a m	29	815	51	5	S by E	1 cloudy	
	5 p m	29	716	01	3	E	1 thunder	0,065
31	9 a m	29	714	51	6	E by N	1 mist	
	5 p m	29	614	21	5	E	1 thunder	0,193
Hat a med.		29	714	21	6	Total depth 1,541		
Gr. height		30	016	23	0			
L. height		29	412	60	9			

AND OBSERVATIONS. 15

AUGUST 1731.

Rain.	D.	Hour.	Baro. In. D.	Ther. In. D.	Hyg. In. D.	Wind. Dir. For.	Weather.	Rain. In D.
0,358	1	9 a m	29	61.5	4.2	0 S E	1 cloudy	0,044
0,017	1	5 p m	29	61.5	5.2	0 S E	1 rain	
	2	9 a m	29	51.3	2.3	8 E	1 rain	0,736
	2	5 p m	29	61.4	8.3	1 E	1 fair	
	3	9 a m	29	61.3	8.2	9 E	1 fair	0,003
	3	5 p m	29	61.4	9.2	6 E	1 fair	
	4	9 a m	29	91.3	9.3	1 E	1 cloudy	
0,143	4	4 p m	29	91.3	8.4	5 E	1 fair	
0,007	5	9 a m	29	91.3	1.4	9 E	1 cloudy	
	5	5 p m	29	91.4	0.4	4 E	1 cloudy	
0,155	6	9 a m	29	91.3	7.2	6 E	1 fair	
	6	4 p m	29	91.4	6.2	1 E	1 fair	
	7	9 a m	29	91.4	0.2	6 E	1 cloudy	
	7	4 p m	29	91.5	5.2	0 E	1 fair	
	8	9 a m	29	91.4	8.2	0 N	1 cloudy	
0,147	8	4 p m	29	81.5	7.1	5 N	1 fair	
	9	9 a m	29	51.3	8.3	8 N W	2 fair	
	9	4 p m	29	41.3	4.1	4 N W	2 fair	
	10	9 a m	29	51.2	7.1	3 N	2 cloudy	
	10	4 p m	29	71.3	2.1	2 N W	1 fair	
0,143	11	9 a m	29	91.1	9.1	3 N W	1 fair	
0,010	11	4 p m	29	91.4	1.1	0 N W	1 fair	
	12	9 a m	30	11.3	0.1	0 N W	1 fair	
	12	4 p m	30	11.4	9.1	1 W	1 fair	
	13	8 a m	30	11.2	7.1	4 W	1 fair	
	13	4 p m	30	11.4	8.1	0 W by N	2 fair	
0,065	14	8 a m	30	11.4	0.1	4 W by N	1 fair	
	14	5 p m	30	11.4	8.1	2 N	1 fair	
0,193	15	9 a m	30	11.3	5.1	8 N E	1 cloudy	
	15	4 p m	30	11.3	7.1	5 E by N	1 cloudy	
	16	8 a m	30	11.2	6.1	5 E by N	1 cloudy	
th 1,541	16	4 p m	30	11.2	9.1	9 E by N	1 cloudy	
								0,783

16 MEDICAL ESSAYS

AUGUST 1731.

D.	Hour.	Baro. In D.	Ther. In D.	Hyg. In D.	Wind. Dir. For.	Weather.	Rain.
17	9 a m	30	0 13	4 1	7 N E	1 cloudy	0,783
	5 p m	30	0 13	9 1	1 S by E	1 fair	0,008
18	8 a m	30	0 12	9 2	3 E	1 fair	—
	5 p m	30	0 13	5 1	7 N E	2 fair	—
19	9 a m	30	1 13	1 2	0 E	1 cloudy	—
	5 p m	30	1 13	2 1	7 E by N	1 fair	—
20	8 a m	30	1 12	4 1	8 E by N	1 cloudy	—
	5 p m	30	0 13	2 1	6 E by N	1 cloudy	—
21	8 a m	30	0 12	8 2	0 E by N	1 cloudy	—
	4 p m	29	9 13	0 1	9 E by N	1 cloudy	—
22	8 a m	29	8 12	8 1	8 E by N	1 cloudy	—
	4 p m	29	6 12	7 2	2 E by N	2 cloudy	—
23	9 a m	29	5 13	1 2	9 E by N	2 cloudy	0,069
	6 p m	29	5 13	2 3	7 N E	1 rain	—
24	8 a m	29	4 12	6 3	8 N E	1 cloudy	0,209
	5 p m	29	5 12	8 2	7 N E	1 cloudy	—
25	8 a m	29	6 12	2 2	3 E by N	1 cloudy	—
	4 p m	29	6 12	8 1	7 E	1 cloudy	—
26	8 a m	29	6 12	0 2	4 E	2 rain	0,164
	5 p m	29	6 11	9 2	6 E	1 rain	—
27	9 a m	29	4 12	6 3	8 N by E	1 fair	0,485
	5 p m	29	4 13	5 2	5 N by E	0 fair	—
28	9 a m	29	4 12	8 3	5 N by E	1 mist	0,033
	5 p m	29	4 13	8 3	3 N by E	1 fog	—
29	9 a m	29	4 13	6 2	8 N by E	0 fog	—
	6 p m	29	4 13	5 3	3 N by E	0 fog	—
30	8 a m	29	13	3 3	4 N E	0 cloudy	0,083
	5 p m	29	4 13	8	3 E by N	1 mist	—
31	8 a m	29	4 13	7 3	9 W	1 cloudy	0,031
	5 p m	29	4 14	6 2	1 S W	1 cloudy	—
H. at med. 29			7 13	5 2	2	Total depth 1,857	
Gr. height 30			13	7 3	8		
L. height 29			4 11	9 1	0		

AND OBSERVATIONS.

17

SEPTEMBER 1731.

Rain.	D.	Hour.	Baro. In D.	Ther. In D.	Hyg. In D.	Wind. Dir. For.	Weather.	Rain. In D.
0,783	1	9 a m	29	413	62	3 S W	1 cloudy	0,025
0,008		6 p m	29	413	72	2 S	0 fair	
—	2	8 a m	29	314	72	3 S W	2 rain	
—		5 p m	29	213	52	1 S W	2 variable	0,566
—	3	8 a m	29	213	82	2 W by S	2 variable	
—		4 p m	29	213	91	6 W by S	3 fair	
—	4	9 a m	29	113	32	0 W by S	3 lowering	0,195
—		5 p m	29	112	71	7 W by S	3 variable	
—	5	9 a m	29	312	01	7 W by N	4 fair	
—		6 p m	29	512	81	5 W by N	3 cloudy	
0,069	6	9 a m	29	413	01	7 W	3 clear	0,091
		4 p m	29	413	01	3 W	3 cloudy	
0,209	7	8 a m	29	411	71	0 W	3 cloudy	—
—		5 p m	29	513	21	2 N W	2 cloudy	
0,164	8	9 a m	29	711	31	3 N W	2 clear	—
0,485		5 p m	29	812	41	4 N by W	2 variable	—
0,033	9	8 a m	30	010	71	4 W	1 fair	—
		4 p m	30	012	51	2 W	1 cloudy	—
0,083	10	8 a m	30	012	71	1 W	2 clear	—
0,031		5 p m	30	013	31	8 W	1 cloudy	—
	11	8 a m	30	012	42	0 W by S	1 clear	—
		4 p m	30	013	61	3 W	2 clear	—
	12	9 a m	29	913	01	7 S W	1 cloudy	0,012
		5 p m	29	813	61	7 S W	2 variable	
	13	8 a m	29	913	12	0 W	1 fair	—
		5 p m	30	014	11	4 W	1 fair	
	14	8 a m	30	113	02	0 W	1 fair	
		4 p m	30	214	51	7 W	1 fair	
	15	8 a m	30	115	21	9 W by N	1 fair	
		6 p m	30	114	01	8 N W	0 fair	
	16	9 a m	30	013	01	8 S W	0 fair	—
		5 p m	29	914	61	4 S W	8 clear	—
th 1,857								0,899

18 MEDICAL ESSAYS

SEPTEMBER 1731.

D.	Hour.	Baro. In D.	Ther. In. D.	Hyg. I. D.	Wind. Dir. For.	Weather.	Rain.
17	8 a m	29 8 13	61	6	S W	2 fair	0,899
	4 p m	29 8 13	21	4	W	3 cloudy	—
18	8 a m	29 6 12	51	5	S W	3 cloudy	0,003
	5 p m	29 4 12	41	5	S W	2 variable	—
19	8 a m	29 6 11	91	5	W	2 clear	0,150
	4 p m	29 7 12	91	5	W	2 cloudy	—
20	8 a m	29 7 13	11	7	S W	2 cloudy	0,054
	5 p m	29 7 13	61	5	S W	1 cloudy	—
21	8 a m	29 6 13	61	6	S by W	2 fair	—
	4 p m	29 5 14	51	5	S by W	3 fair	—
22	8 a m	29 6 12	22	2	W	1 rain	—
	5 p m	29 5 12	02	4	N E	1 variable	—
23	8 a m	29 6 12	22	5	W by N	1 rain	0,763
	5 p m	29 7 11	92	0	W by N	1 fair	—
24	8 a m	29 9 11	22	0	N W	1 fair	0,030
	6 p m	29 9 11	71	8	N W	1 fair	—
25	8 a m	29 8 12	31	7	S E	1 fair	—
	5 p m	29 7 12	11	7	S E	1 fair	—
26	9 a m	29 6 12	82	2	S E	1 cloudy	—
	4 p m	29 5 14	01	9	S E	1 cloudy	—
27	9 a m	29 3 13	02	0	S E	1 cloudy	0,045
	5 p m	29 2 13	21	8	S	1 variable	—
28	9 a m	29 4 12	51	8	S by W	1 fair	0,611
	4 p m	29 2 13	01	7	S	4 rain	—
29	9 a m	29 0 13	02	6	W by S	4 stormy	0,155
	5 p m	29 12	11	6	W	3 clear	—
30	9 a m	29 3 14	31	9	S	2 cloudy	0,010
	3 p m	29 3 14	31	5	S W	3 cloudy	—
Hat a med.		29 6 12	91	7	Total depth 2,121		
Gr. height		30 2 14	72	5			
L. height		29 0 10	71	1			

AND OBSERVATIONS.

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OCTOBER 1731.

Rain.	No.	Hour.	Baro. In. D.	Ther. In. D.	Hyg. I. D.	Wind. Dir. For.	Weather.	Rain. In D.
0.899	1	9 a m	29.4	12	11	8 S W	3 variable	0.085
0.003	5	p m	29.6	12	8	1 S W	2 variable	
0.150	2	9 a m	29.6	13	6	1 S W	3 variable	0.090
0.054	4	p m	29.7	14	3	1 S W	3 cloudy	
	3	9 a m	29.9	14	2	2 W	2 clear	
	4	p m	29.9	13	0	1 W	2 clear	
	4	9 a m	29.8	14	0	1 W	1 rain	0.390
	5	p m	29.8	14	7	1 N W	1 variable	
	5	9 a m	29.0	10	5	2 S W	1 fair	0.007
	4	p m	29.8	11	8	1 S W	2 variable	
	6	8 a m	29.7	11	7	2 W	2 fair	
0.763	4	p m	29.8	12	1	1 W	2 fair	
0.036	7	8 a m	29.6	12	4	2 S W	3 cloudy	
	5	p m	29.5	13	2	0 W	3 variable	
	8	9 a m	29.7	11	5	1 W	3 clear	
	5	p m	29.9	10	7	1 N	3 clear	
	9	8 a m	30.0	9	4	1 N	2 mist	
	4	p m	30.0	11	2	1 W	1 cloudy	
0.045	10	9 a m	29.7	12	6	2 W by S	2 cloudy	
	4	p m	29.6	13	0	0 W	2 cloudy	
0.611	11	8 a m	29.8	10	0	1 N E	2 clear	
	5	p m	29.9	10	7	1 E by N	1 clear	
0.155	12	9 a m	30.0	10	6	1 S E	2 cloudy	
	5	p m	30.0	10	5	1 S E	2 clear	
0.010	13	8 a m	29.8	10	2	1 S E	1 fair	
	4	p m	29.7	11	5	1 S E	1 fair	
	14	8 a m	29.6	11	6	2 S E	1 fair	0.025
	9	p m	29.5	12	3	5	rain	
2.121	15	9 a m	29.5	11	9	2 W	1 fair	0.259
	4	p m	29.5	12	4	1 W	1 clear	
	16	9 a m	29.5	11	2	2 S W	1 fair	0.062
	5	p m	29.5	11	7	1 S W	1 rain	

OCTOBER 1731.

D.	Hour.	Baro. In. D.	Ther. In D.	Hyg. I. D.	Wind. Dir. For.	Weather.	Rain.
							0,826
21	9 a m	29	413	71	8 S W	3 cloudy	—
	4 p m	29	513	21	8 S W	1 cloudy	—
18	8 a m	29	712	42	0 S W	1 clear	—
	4 p m	29	713	22	0 S	1 cloudy	—
19	8 a m	29	611	71	9 S by E	0 fair	0,062
	5 p m	29	811	61	6 S	3 fair	—
20	9 a m	29	910	71	9 S by E	1 cloudy	0,046
	4 p m	29	911	42	0 S by E	1 cloudy	—
21	8 a m	29	911	42	0 S by E	1 cloudy	—
	5 p m	29	811	41	9 S by E	1 cloudy	—
22	9 a m	29	810	31	9 S by W	1 fair	0,009
	4 p m	29	811	31	8 S by W	1 fair	—
23	9 a m	29	611	21	7 S	1 cloudy	—
	4 p m	29	512	11	8 S	1 rain	—
24	9 a m	29	710	32	0 S	2 clear	—
	4 p m	29	711	41	9 S	1 cloudy	—
25	9 a m	29	611	52	3 S	1 cloudy	—
	5 p m	29	511	42	0 S	1 cloudy	—
26	9 a m	29	511	52	2 S	1 fog	0,085
	4 p m	29	412	02	1 S E	1 cloudy	—
27	9 a m	29	511	72	4 S W	1 rain	—
	4 p m	29	611	42	7 E	1 rain	—
28	9 a m	29	712	53	7 N E	2 mitt	0,246
	4 p m	29	712	03	4 S E	1 cloudy	—
29	9 a m	29	612	13	1 S E	1 cloudy	0,010
	5 p m	29	512	23	0 S E	1 cloudy	—
30	9 a m	29	311	82	8 S E	2 cloudy	—
	4 p m	28	911	92	7 S E	3 cloudy	—
31	9 a m	28	810	52	4 S by W	1 rain	0,198
	4 p m	28	810	11	3 S W	1 cloudy	—
H. at med.		29	311	72	0	Total depth	
Gr. height		30	014	33	4		
L. height		28	810	81	3		

AND OBSERVATIONS. 21

NOVEMBER 1731.

Rain.	Hour.	Baro. In D.	Ther. In D.	Hyg. I. D.	Wind. Dir. For.	Weather.	Rain. In D.
0,826	10 a m 28	8 8	72	4	S W	1 clear	0,273
—	4 p m 28	9 9	32	4	S W	1 clear	—
—	28 a m 28	9 9	22	5	W	2 cloudy	—
0,062	4 p m 29	1 9	03	4	W	2 clear	—
0,046	30 a m 29	1 9	52	5	W	2 clear	0,025
—	4 p m 29	2 10	42	4	W	2 cloudy	0,034
0,009	40 a m 29	2 10	62	1	W	2 clear	—
—	4 p m 29	3 10	52	0	W	2 clear	—
—	50 a m 29	4 10	02	3	W	2 cloudy	—
—	4 p m 29	3 10	22	3	W	2 cloudy	—
—	68 a m 29	7 8	52	4	W	2 clear	—
—	4 p m 29	2 9	02	0	N W	2 clear	—
—	70 a m 29	3 8	42	0	N W	1 clear	—
—	4 p m 29	4 8	62	0	N W	1 clear	—
—	80 a m 29	4 8	62	2	N W N	1 mist	—
—	3 p m 29	3 9	22	2	N E	1 clear	—
—	90 a m 29	3 9	92	4	E	2 cloudy	0,093
—	4 p m 29	3 9	92	4	E	2 cloudy	—
0,085	100 a m 29	4 10	12	5	N E	3 rain	0,254
—	3 p m 29	4 10	13	0	N E	3 rain	—
—	110 a m 29	6 10	03	8	N E	2 cloudy	—
—	3 p m 29	7 10	23	4	N E	2 cloudy	—
0,246	120 a m 29	6 10	23	1	S W	2 cloudy	—
0,080	4 p m 29	5 10	62	6	W	2 cloudy	0,286
—	130 a m 29	7 9	72	8	W	1 clear	—
—	3 p m 29	7 10	62	6	W	1 cloudy	—
—	140 a m 29	5 12	32	8	W	3 cloudy	—
—	4 p m 29	6 12	62	9	W	3 cloudy	—
0,198	150 a m 29	8 12	03	0	W	3 clear	—
—	4 p m 29	9 12	22	9	W	1 cloudy	—
—	160 a m 30	0 1	12	9	W	1 fog	—
—	2 p m 30	9 1	82	8	W by S	1 cloudy	—
—							0,965

NOVEMBER 1731.

D.	Hour.	Baro. In. D.	Ther. In. D.	Hyg. l. D.	Wind. Dir. For.	Weather.	Rain.
							0,965
17	9 a m	29	8 11	5 2	8 S W	1 cloudy	—
	2 p m	29	7 11	8 2	7 S W	1 cloudy	
18	9 a m	29	8 11	6 2	8 W	2 clear	
	2 p m	29	8 12	0 2	6 W	2 cloudy	
19	9 a m	29	5 10	9 2	5 W	3 cloudy	
	2 p m	29	4 10	6 2	2 W	3 cloudy	
20	8 a m	29	8 9	1 2	0 N W	1 clear	0,021
	2 p m	29	9 9	9 2	0 W	1 cloudy	
21	11 a m	29	9 11	2 2	1 W	2 clear	
	4 p m	29	8 11	1	0 W	2 clear	
22	9 a m	29	6 10	3 2	1 W	3 clear	
	4 p m	29	6 10	3 2	0 W	3 cloudy	
23	9 a m	29	5 8	9 2	3 W	2 clear	0,203
	3 p m	29	5 9	5 2	1 W	3 cloudy	
24	9 a m	29	7 8	4 2	0 N W	2 cloudy	
	3 p m	29	8 8	8 2	0 N W	3 cloudy	
25	9 a m	29	9 7	8 2	0 N W	2 frost	—
	2 p m	29	9 8	6 1	9 N W	2 fair	
26	9 a m	30	1 7	4 1	9 N W	2 frost	
	3 p m	30	1 8	3 1	4 N W	2 fair	
27	9 a m	30	3 8	0 1	2 W	1 frost	
	2 p m	30	3 8	4 1	2 W	1 cloudy	
28	9 a m	30	1 9	2 2	1 S E	1 fair	
	4 p m	30	0 9	2 2	1 E	1 fair	
29	9 a m	29	6 9	2 2	2 E	1 fog	
	2 p m	29	5 9	2 2	3 E by S	1 foggy	
30	9 a m	29	5 9	4 2	0 S W	2 cloudy	
	4 p m	29	5 9	5 2	1 S W	2 cloudy	0,233
H. at a med.		29	8 9	8 2	3	Total depth 1,411	
Gr. height		30	3 12	6 3	8		
L. height		28	0 7	4 1	2		

AND OBSERVATIONS. 23

DECEMBER 1731.

Rain.	D.	Hour.	Baro. In. D.	Ther. In. D.	Hyg. I. D.	Wind. Dir. For.	Weather.	Rain. In D.	
0,965	1	9 a m	29	8	8	2 2 3	W by S	1 clear	0,075
—	1	2 p m	29	8	9	1 2 0	W by S	1 clear	—
0,021	2	9 a m	29	9	9	8 2 4	S W	2 cloudy	—
—	2	2 p m	29	9	11	0 2 5	S W	3 cloudy	—
0,203	3	9 a m	29	6	9	9 2 4	W	3 clear	—
—	3	2 p m	29	6	10	2 2 1	W	3 clear	—
0,203	4	9 a m	29	5	9	0 2 6	W	2 fog	—
—	4	2 p m	29	5	9	9 2 4	W	2 fog	—
—	5	9 a m	29	3	11	7 2 9	W	4 cloudy	—
—	5	3 p m	29	2	11	4 2 3	W	4 clear	—
—	6	9 a m	29	4	9	4 2 2	W	2 clear	0,052
—	6	2 p m	29	4	9	7 2 2	W	2 clear	—
—	7	9 a m	28	9	8	9 3 5	N	3 rain	—
—	7	2 p m	29	8	5	3 4	N	2 fair	—
—	8	9 a m	29	4	7	3 2 3	W	2 frost	—
—	8	2 p m	29	5	7	6 2 3	W	2 frost	—
—	9	9 a m	29	3	8	3 2 3	S E	3 stormy	—
—	9	2 p m	29	6	9	4 2 4	S	3 stormy	0,175
—	10	2 p m	29	2	10	2 2 2	W	3 cloudy	—
—	11	9 a m	29	7	10	6 2 6	S W	2 cloudy	—
—	11	2 p m	29	8	11	2 2 5	W	2 clear	—
—	12	9 a m	29	6	10	3 2 1	W	4 lowering	0,173
—	12	3 p m	29	6	9	3 2 2	W	4 cloudy	—
—	13	9 a m	29	4	10	9 2 4	W	3 cloudy	—
—	13	2 p m	29	4	11	4 2 1	W	3 cloudy	—
—	14	9 a m	29	5	9	4 2 7	N W	4 clear	0,081
—	14	2 p m	29	7	9	3 2 8	N W	3 fair	—
0,233	15	9 a m	29	9	7	8 1 8	S	1 frost	0,030
—	15	2 p m	29	8	8	8 1 7	S	1 cloudy	—
—	16	9 a m	29	6	9	2 2 4	W	1 clear	0,070
—	16	2 p m	29	6	9	8 2 3	W	1 clear	—
0th 1,411	17	9 a m	29	3	9	5 2 3	S W	1 cloudy	—
									1,666

24 MEDICAL ESSAYS.

DECEMBER 1731.

D.	Hour.	Baro.	Ther.	Hyg	Wind.	Weather.	Rain.
		In D.	In D.	I. D.	Dir. For.		
	4 p m	19	2	8	8 1	4 W	1 snow 1,656
18	9 a m	19	4	8	8 2	5 N	3 rain 0,092
	2 p m	19	3	9	3 2	0 N	2 cloudy
19	9 a m	19	8	8	3 2	0 N	2 cloudy
	2 p m	19	8	9	0 2	0 N	2 cloudy
20	9 a m	19	6	8	5 2	4 N W	1 cloudy
	2 p m	19	8	8	8 2	1 N W	1 clear
21	9 a m	10	0	7	5 2	2 W	1 frost 0,237
	2 p m	10	0	8	5 2	3 W	2 clear
22	9 a m	10	1	8	8 2	9 E	1 fog
	2 p m	10	2	9	3 2	8 E	2 clear
23	9 a m	19	5	8	7 2	5 S E	1 fog
	2 p m	19	9	8	8 2	6 S E	1 clear
24	8 a m	29	8	8	3 2	8 N	2 cloudy
	2 p m	29	7	8	4 2	5 N W	2 clear
25	8 a m	29	9	8	8 2	5 W	2 rain 1,027
	2 p m	29	8	9	2 2	6 N W	2 cloudy
26	9 a m	29	6	6	7 2	0 W	2 frost
	3 p m	29	5	6	8 2	1 N W	2 snow
27	9 a m	29	4	6	3 1	9 W	2 clear
	2 p m	29	4	6	3 1	9 W	2 clear
28	9 a m	29	5	5	7 2	1 W	2 frost 0,080
	2 p m	29	5	6	9 2	0 W	2 cloudy
29	8 a m	10	1	7	6 2	8 W	1 snow
	2 p m	29	1	9	2 3	2 W	1 cloudy
30	9 a m	29	2	10	9 3	0 S W	2 cloudy
	2 p m	29	3	11	5 2	8 S	3 cloudy
31	9 a m	29	7	11	3 2	6 S W	1 cloudy 0,023
	2 p m	29	7	11	4 2	3 S W	1 fair
Total depth 3,175							
H. at a med.		29	5	9	0 2	3	
Gr. height		30	2	11	7 3	5	
L. height		28	9	5	7 1	7	

AND OBSERVATIONS. 25

JANUARY 1732

Rain.	D.	Hour.	Baro. In. D.	Ther. In. D.	Hyg. J. D.	Wind. Dir. For.	Weather.	Rain. In D.
1,656	1	9 a m	29	8 10	3 1	8 E	1 fair	0,035
0,092	2	2 p m	29	8 10	5 1	9 S E	2 fair	
	2	9 a m	30	0 8	9 2	5 S E	2 fog	—
	3	3 p m	30	0 9	1 2	6 S E	2 fog	—
	3	9 a m	30	1 8	4 2	5 S E	2 fog	—
	3	3 p m	30	1 8	6 2	4 S E	2 clear	
0,237	4	9 a m	30	2 8	6 2	1 S E	1 fog	
	4	2 p m	30	2 9	0 2	2 S E	1 fog	
	5	9 a m	30	2 9	3 3	4 E	2 mist	0,023
	5	2 p m	30	2 9	1 3	2 N E	2 cloudy	
	6	9 a m	30	0 9	3 3	5 N E	2 rain	
	6	2 p m	29	0 9	4 3	0 N E	2 clear	
	7	9 a m	29	0 8	4 2	3 W	2 cloudy	
	7	2 p m	29	5 8	3 3	0 W	2 snow	
	8	9 a m	29	3 7	5 2	3 W	2 frost	
1,027	8	2 p m	29	3 7	7 2	2 W by N	2 frost	
	9	9 a m	29	4 7	2 1	2 W	2 frost	0,075
	9	4 p m	29	4 7	8 2	4 W	2 cloudy	
	10	9 a m	29	7 6	8 2	1 W	2 frost	—
	10	2 p m	29	8 7	4 2	0 W	1 frost	—
0,080	11	9 a m	29	7 7	5 2	4 S E	2 fair	
	11	2 p m	29	7 8	4 2	5 S E	2 cloudy	
	12	9 a m	29	7 8	5 2	9 S E	2 fog	
	12	2 p m	29	8 9	1 2	8 S E	2 cloudy	
	13	9 a m	29	7 8	2 2	8 S by E	2 fog	
	13	4 p m	29	7 8	2 2	8 S by E	2 fog	
0,023	14	9 a m	29	7 6	9 2	8 S	2 frost	0,173
	14	2 p m	29	7 7	7 2	5 S	2 frost	
	15	9 a m	29	5 6	9 3	0 S E	1 frost	
	15	2 p m	29	5 8	1 3	2 S E	2 fog	
th 3,173	16	9 a m	30	4 7	7 3	2 S E	2 frost	0,083
	16	4 p m	30	3 8	5 2	5 S E	2 fog	
								0,385

JANUARY 1732.

D.	Hour.	Baro. In D.	Ther. In D.	Hyg I. D.	Wind. Dir. For.	Weather.	Rain.
27	9 a m	19	0 8	9 2	8 E	2 fog	0,385
	4 p m	19	0 9	1 3	0 E	2 rain	
28	9 a m	19	1 8	7 3	8 N E	3 fog	
	4 p m	19	2 8	6 3	5 N E	3 rain	
29	9 a m	19	4 8	0 2	5 E	2 snow	
	4 p m	19	5 8	4 2	3 E	2 fair	
30	9 a m	19	7 7	0 2	2 W	2 frost	0,158
	4 p m	19	7 7	6 2	2 W	2 frost	
31	9 a m	19	8 7	2 2	2 W	2 frost	
	4 p m	19	7 8	1 2	2 W	2 frost	
22	9 a m	19	7 9	0 2	8 W	2 fresh	0,035
	4 p m	19	7 9	1 2	6 W	2 fresh	
23	9 a m	19	7 8	7 2	5 W	2 fair	—
	4 p m	19	7 9	0 2	5 W	1 fair	
24	9 a m	19	7 8	5 2	6 S	2 fair	0,120
	4 p m	19	6 9	6 2	5 S	2 fair	
25	9 a m	19	4 11	0 2	5 S	3 rain	
	4 p m	19	4 11	4 2	5 S W	3 rain	
26	9 a m	19	3 11	4 2	5 S W	2 cloudy	
	4 p m	19	2 11	5 2	3 S W	3 cloudy	
27	9 a m	19	1 10	2 2	3 S by W	2 fair	0,189
	4 p m	19	1 10	8 2	2 S	2 fair	
28	9 a m	19	9 9	8 2	7 S E	1 rain	0,052
	4 p m	19	0 10	6 2	6 S W	2 fair	
29	9 a m	19	1 9	3 2	5 S E	2 fair	
	4 p m	19	1 10	3 2	4 S E	2 cloudy	
30	9 a m	19	3 9	9 2	8 S W	2 cloudy	
	4 p m	19	4 10	2 2	7 S W	2 cloudy	
31	9 a m	19	5 10	4 2	6 S by W	2 cloudy	0,744
	4 p m	19	5 11	5 2	3 S by W	2 fair	
H. at med.		19	3	8	8 2	5	Total depth 2,283
Gr. height		30		11	5 3	8	
L. height		28	5	6	0 1	8	

AND OBSERVATIONS. 27

FEBRUARY 1732.

Rain.	D. Hour.	Baro. (n. D.)	Ther. In. D.	Hyg. f. D.	Wind. Dir. For.	Weather.	Rain. In D.
0,385	19 a m	19	6 11	6 2	5 S W	2 cloudy	0,053
	4 p m	19	7 11	3 1	8 S W	2 cloudy	
	29 a m	19	7 11	0 2	1 S by W	2 fair	0,027
	3 p m	19	6 11	8 2	1 S by W	3 fair	
	39 a m	19	6 11	9 2	2 S W	2 fair	0,063
	2 p m	19	6 12	5 2	2 S W	3 fair	
0,158	49 a m	19	5 12	0 2	3 S W	3 rain	—
	3 p m	19	4 12	4 2	2 S W	3 cloudy	
	39 a m	19	6 10	1 2	7 E	1 rain	0,205
	4 p m	19	6 9	9 3	0 E	1 cloudy	
0,035	69 a m	19	6 10	9 2	6 W	2 cloudy	0,110
—	4 p m	19	0 11	3 2	5 W	3 cloudy	
	79 a m	19	0 8	6 2	2 S E	2 snow	0,197
	3 p m	18	8 9	8 2	3 W	3 fair	
0,120	89 a m	18	7 9	0 2	6 N E	1 fair	
	12 p m	19	0 8	9 2	3 N	2 fair	
	99 a m	19	4 9	2 2	2 S	3 cloudy	0,262
	3 p m	19	3 10	9 2	4 S W	3 cloudy	
	109 a m	19	4 9	9 2	3 S W	3 cloudy	0,402
	4 p m	19	5 10	6 2	0 W	2 fair	
0,189	119 a m	19	9 9	6 2	3 W	3 cloudy	0,145
	5 p m	19	2 9	7 2	2 W	3 cloudy	
0,052	129 a m	19	4 9	1 2	2 W	2 clear	
	5 p m	19	6 10	0 1	8 W	2 cloudy	
	139 a m	30	1 8	9 2	0 S W	1 cloudy	0,088
	5 p m	30	2 10	1 1	8 S by W	2 cloudy	
	148 a m	19	9 0	7 2	2 S W	3 cloudy	
	12 p m	19	5 12	0 2	0 S W	3 cloudy	
0,244	159 a m	19	8 10	6 2	6 W	2 clear	0,209
	12 p m	19	8 11	8 2	3 W	2 cloudy	
	169 a m	19	6 11	6 2	0 W	2 fair	
1,283	12 p m	19	6 11	3 1	8 W	3 fair	
							1,761

28 MEDICAL ESSAYS

FEBRUARY 1732.

D.	Hour	Baro. [n. D.]	Ther. In. D.	Hyg. l. D.	Wind. Dir. For.	Weather.	Rain
17	8 a n	29 8	9 8	2 4	W	2 fair	1,768
	5 p m	29 9	11 2	2 0	W	3 cloudy	=
18	2 p m	29 8	12 6	1 1	S W	2 fair	
19	9 a m	29 8	11 6	2 2	S W	1 fair	
20	1 p m	29 5	11 7	7 7	S W	3 fair	
21	9 a m	29 1	11 3	1 9	S W	3 cloudy	
	2 p m	29 1	10 8	1 5	S W	3 cloudy	
22	8 a n	29 3	9 2	2 1	W	2 clear	0,315
	5 p m	29 4	9 4	1 9	W	2 clear	
23	2 p m	29 5	9 9	1 7	W	2 clear	
24	2 p m	29 6	10 3	1 5	S	2 clear	
25	10 a m	29 3	9 3	1 7	W	3 snow	0,194
	2 p m	29 3	9 4	1 5	W	3 clear	
26	9 a m	29 3	9 4	2 0	S	3 rain	0,062
	3 p m	29 3	12 2	2 2	W	3 cloudy	
27	9 a m	29 5	11 5	1 8	S W	3 cloudy	
	5 p m	29 4	12 0	2 0	S W	4 rain	
28	9 a m	29 6	9 4	2 0	S W	3 clear	0,077
	5 p m	29 7	10 2	1 7	W	2 clear	
29	9 a m	29 8	9 5	1 9	W	2 clear	
	5 p m	29 8	10 7	1 5	W	1 clear	
H. at a med.		29 4	10 4	2 1	Total depth 2,409		
Gr. height		30 2	12 8	3 0			
L. height		28 7	8 6	1 5			

29

ain

761

0.315

0,194

0,062

0,077

2,409

MARCH 1732.

D.	Hour.	Baro. In D.	Ther. In D.	Hyg In D.	Wind. Dir. For.	Weather.	Rain.	D.
17	9 a m	29	6 10	4 2	E	cloudy	0,276	19
	4 p m	29	7 11	7 2	S W	cloudy	0,014	5
18	9 a m	29	6 11	4 2	S W	rain	0,056	29
								5
19	9 a m	29	6 12	5 2	W	cloudy		39
	5 p m	29	7 13	4 1	W	cloudy		5
20	9 a m	29	8 12	9 2	W	clear		49
	5 p m	29	8 13	6 1	W	cloudy		6
21	9 a m	29	8 12	3 2	W	fog	0,015	59
	3 p m	29	8 13	6 2	W	cloudy		5
22	9 a m	29	9 12	1 2	W	clear		69
	1 p m	29	9 12	6 1	W	cloudy		5
23	9 a m	29	9 12	4 1	S W	cloudy		79
	4 p m	29	9 13	4 1	W	cloudy		5
24	10 a m	29	9 13	1 1	W	cloudy	0,031	89
	5 p m	29	9 13	1 1	W	fair		5
25	9 a m	29	9 10	7 1	W	fair		99
	5 p m	29	8 10	5 1	N W	fair		5
26	9 a m	29	7 9	5 1	N W	cloudy	0,030	109
	5 p m	29	7 10	1 1	N W	hail		6
27	9 a m	29	6 9	1 1	N W	fair	0,030	119
	4 p m	29	6 9	1 1	N	snow		5
28	9 a m	29	6 9	4 1	E	snow		129
	5 p m	29	5 9	7 1	E	fair		5
29	9 a m	29	5 9	4 1	E	fair	0,138	139
	6 p m	29	5 9	5 1	E	fair		7
30	9 a m	29	6 9	7 2	E	cloudy		149
	4 p m	29	5 9	7 1	E	cloudy		7
31	9 a m	29	5 9	9 3	E	rain	0,173	159
	4 p m	29	5 9	9 3	E	rain		4
								169
								5
H at a med.		29	6 10	4 1	8	Total dep h 0,793		
Gr. height		30	1 13	6 3	4			
L. height		29	2 7	6 1	2			

AND OBSERVATIONS. 31

APRIL 1732.

Rain.	D.	Hour.	Baro. In. D.	Ther. In. D.	Hyg. I. D.	Wind. Dir. For.	Weather.	Rain. In D.
0,276	1	a m	29	5 9	83	4 E	2 fog	0,193
0,014		5 p m	29	5 9	93	3 E	2 fog	
0,056	2	a m	29	6 10	33	4 E	2 fog	0,095
		5 p m	29	6 10	92	4 E	1 fog	
	3	a m	29	6 10	92	7 S E	1 cloudy	0,070
		5 p m	29	5 12	72	0 S	1 cloudy	
	4	a m	29	3 11	92	3 S	1 rain	
0,015		6 p m	29	3 12	41	9 S W	2 fair	
	5	a m	29	4 12	71	9 S W	2 fair	0,082
		5 p m	29	5 13	21	6 S W	1 fair	
	6	a m	29	7 10	63	0 E	2 mist	
		5 p m	29	7 10	92	9 E	2 mist	
	7	a m	29	7 10	23	6 E	2 mist	
0,031		5 p m	29	7 10	83	5 E	2 mist	
	8	a m	29	7 10	53	8 E	2 mist	0,097
		5 p m	29	7 11	62	9 E	2 mist	
	9	a m	29	8 10	63	6 E	2 mist	
		5 p m	29	9 10	83	3 E	2 mist	
0,030	10	a m	30	0 10	43	3 E by N	2 hazy	
0,030		6 p m	30	0 11	02	5 E	2 hazy	
	11	a m	29	9 10	52	5 N E	3 variable	0,030
		5 p m	29	8 10	92	2 N E	2 fair	
	12	a m	29	6 10	62	5 S W	2 clear	
		5 p m	29	5 11	91	8 N E	2 cloudy	
0,138	13	a m	29	6 9	31	6 N W	3 cloudy	0,350
		7 p m	29	6 9	51	5 N W	3 snow	
	14	a m	29	5 9	11	4 N W	3 cloudy	
		7 p m	29	5 9	61	4 N W	3 cloudy	
0,173	15	a m	29	5 9	91	3 N W	3 clear	0,105
		4 p m	29	5 10	91	2 N W	2 cloudy	
0,793	16	a m	29	5 9	01	3 N W	2 clear	
		5 p m	29	6 10	71	1 N by W	2 cloudy	

1,022

APRIL 1732.

D.	Hour.	Baro. In D.	Ther. In. D.	Hyg. I. D.	Wind. Dir. For.	Weather.	Rain.
17	9 a m	29 7	10	21	3 N by E	1 clear	1,021
	5 p m	29 7	11	31	2 N W	1 clear	
18	9 a m	29 7	10	81	3 N W	1 clear	0,131
	5 p m	29 7	11	81	4 S E	2 cloudy	
19	8 a m	29 7	10	61	5 S E	2 rain	
	5 p m	29 7	10	11	9 E	2 rain	
20	9 a m	29 7	10	53	4 E	2 cloudy	0,119
	5 p m	29 6	10	82	0 E	1 cloudy	
21	9 a m	29 6	11	82	7 E	1 fog	0,152
	5 p m	29 6	12	42	4 E	1 rain	
22	9 a m	29 5	12	42	3 W	1 cloudy	0,209
	6 p m	29 5	12	52	2 S W	1 rain	
23	9 a m	29 5	11	42	9 S E	1 rain	
	7 p m	29 5	11	82	5 S E	1 rain	
24	9 a m	29 1	12	42	1 S	1 cloudy	0,568
	5 p m	29 2	13	41	6 S by W	2 clear	
25	9 a m	29 3	12	72	1 S	2 rain	0,154
	4 p m	29 4	13	01	8 E	2 rain	
26	9 a m	29 7	10	12	3 E	2 clear	0,074
	6 p m	29 7	11	21	7 E	2 clear	
27	9 a m	29 8	10	61	7 N E	2 clear	—
	5 p m	29 8	12	51	4 N E	1 cloudy	
28	9 a m	29 7	12	01	0 W	2 cloudy	0,058
	4 p m	29 6	10	01	6 N W	2 rain	
29	9 a m	29 6	11	22	0 N E	2 cloudy	0, 61
	7 p m	29 6	10	02	2 N W	3 hail	
30	9 a m	29 6	9	82	5 W by N	3 cloudy	0,357
	5 p m	29 5	10	71	6 W by N	3 rain	
H. at med. 29 5 10 82 1							Total depth 3,156
Gr. height 30 0 13 23 8							
L. height 29 1 9 01 1							

AND OBSERVATIONS. 33

MAY 1732.

Rain.	Hour.	Baro. In D.	Ther. In D.	Hyg. In D.	Wind. Dir. For.	Weather.	Rain. In D.
1,022	1 9 a m 29	5 9	5 2	5	S E	2 cloudy	0,327
	5 p m 29	4 9	1 2	5	N E	2 rain	
0,131	2 9 a m 29	5 9	3 1	6	W	2 clear	0,155
	5 p m 29	5 10	7 1	3	W by N	2 clear	
	3 9 a m 29	6 9	8 1	4	W by N	2 clear	0,093
	5 p m 29	6 12	6 1	1	W by N	2 clear	
0,119	4 9 a m 29	6 10	6 1	5	N W	2 clear	—
0,152	4 p m 29	6 10	8 1	4	N W	2 clear	
	5 9 a m 29	6 10	1 1	4	N by E	2 cloudy	
0,209	5 p m 29	6 11	8 1	1	N	2 clear	
	6 9 a m 29	8 12	1 1	3	N	2 clear	
	4 p m 29	8 12	0 1	0	N E	2 clear	
	7 9 a m 29	9 12	9 1	1	S E	2 clear	
0,568	4 p m 29	8 13	5 1	0	S E	2 clear	
	8 9 a m 29	6 11	8 1	6	E	2 cloudy	—
0,154	5 p m 29	5 12	9 1	7	S	2 rain	
	9 9 a m 29	6 2	6 1	5	S W	2 cloudy	0,099
0,074	5 p m 29	5 12	8 1	5	S E	2 rain	
—	10 9 a m 29	4 12	7 1	6	S	2 cloudy	
	3 p m 29	4 12	6 1	5	S	2 rain	
0,058	11 9 a m 29	3 12	4 1	5	S W	3 cloudy	0,173
	5 p m 29	3 13	9 1	0	S W	3 clear	
	12 9 a m 29	2 12	7 1	5	W	3 clear	0,237
0, 62	5 p m 29	3 12	5 1	5	W	3 rain	
	13 9 a m 29	5 12	2 1	4	W	2 cloudy	0,192
0,357	1 p m 29	5 12	7 1	5	S	2 rain	
	14 9 a m 29	4 13	7 2	0	S W	2 cloudy	0,125
	5 p m 29	4 13	5 1	5	S W	3 cloudy	
h 3,136	15 9 a m 29	5 13	5 1	6	S W	2 cloudy	0,157
	8 p m 29	5 13	4 1	4	S	3 cloudy	
	16 9 a m 29	5 13	2 1	4	S W	2 cloudy	
	5 p m 29	7 14	3 1	3	N E	2 cloudy	

1,658

34 MEDICAL ESSAYS

MAY 1732.

D.	Hour.	Baro. In. D.	Ther. In. D.	Hyg. l. D.	Wind. Dir. For.	Weather.	Rain.
17	8 a m	29	9 10	0 1	2 E by N	3 rain	1 658
	5 p m	29	9 11	3 1	5 E	2 cloudy	0,298
18	8 a m	29	9 10	9 1	7 N W	2 cloudy	0,064
	4 p m	29	9 11	1 1	5 N W	2 clear	
19	8 a m	29	8 10	5 1	3 N W	2 cloudy	0,313
	4 p m	29	7 11	1 1	3 N W	2 hail	
20	8 a m	29	6 10	5 1	5 N	1 cloudy	0,279
	4 p m	29	7 11	8 1	5 E	1 cloudy	
21	8 a m	29	7 12	5 1	4 S	1 clear	
	4 p m	29	7 13	1 1	4 S E	1 cloudy	
22	9 a m	29	7 12	2 1	2 W	2 rain	0,411
	5 p m	29	7 13	0 1	1 W by N	2 rain	
23	9 a m	29	5 11	9 1	5 E by S	1 cloudy	0,195
	5 p m	29	4 12	8 1	0 E by S	2 cloudy	
24	9 a m	29	4 12	5 1	5 S	2 rain	0,177
	4 p m	29	4 12	9 1	2 E	2 rain	
25	9 a m	29	4 11	9 1	9 E by S	1 cloudy	0,305
	4 p m	29	4 12	6 1	0 E	1 cloudy	
26	8 a m	29	5 11	8 1	5 E	1 cloudy	0,392
	4 p m	29	4 12	8 1	9 E	2 cloudy	
27	9 a m	29	1 12	5 1	0 E	2 cloudy	0,185
	7 p m	29	0 13	7 1	8 S	1 cloudy	
28	8 a m	29	0 13	2 1	9 S	2 cloudy	0,140
	4 p m	29	1 14	0 1	5 S	2 cloudy	
29	8 a m	29	2 13	5 1	7 S	2 clear	0,061
	4 p m	29	3 14	5 1	3 S	2 clear	
30	9 a m	29	5 13	4 1	8 S W	2 rain	0,094
	5 p m	29	5 14	6 1	7 S W	2 cloudy	
31	8 a m	29	5 12	6 1	0 S E	2 cloudy	0,055
	5 p m	29	5 14	6 1	3 W	2 clear	
H. at med. 29		5	12	2	1	6	Total depth 4,627
Gr. height 29		9	14	6	3	0	
L. height 29		0	9	1	1	0	

IV *An Account of the DISEASES that were most frequent last year in Edinburgh.*

HAVING undertaken to give some account yearly of the diseases that shall be observed most frequent in this city and neighbouring places, and of their changes and successions, we judged it most proper to begin our observations at some intermediate period betwixt the two grand classes of epidemical distempers, according to the sagacious Sydenham, the *vernal* and *autumnal*. Our medical year therefore shall commence at the summer solstice, when the spring diseases are generally worn out, and before the declension of the sun has brought on the product of the autumn.

In the year 1731, in the month of June, many were seized with a swelling on the face, and salivary glands, which was not attended with a fever or redness of the skin, and was easily removed by a gentle purgative or two.

In the succeeding months of July and August, this swelling turned more upon the erysipelas kind, and fell chiefly upon the forehead and eye-lids; the skin, however, was not very high coloured, nor the fever violent: This was likewise carried off by purging and vesicatories. Near of kin to this were the ophthalmia, tooth-ach, pains in the head, and a slight rheumatism, all which were very frequent about the same time, but none of them were accompanied with so acute a fever, or such violent symptoms as required large evacuations; for generally once bleeding relieved the patients,

ents, and a few doses of cathartics completed the cure.

Towards the end of July, some agues began to appear ; but these had nothing singular, and yielded easily to the usual treatment.

The crystal or bastard small pox broke out among the children in August, sometimes preceded by the feverish symptoms, but for the most part these were very gentle, and the eruption easy. Some children, when the first pustules were well advanced, or going off, had a second eruption of fresh pustules, and some a third : But still this sort of small pox was very kindly, and without danger, requiring little more than a cooling regimen or low diet. At the same time several persons were taken with a gentle cholera which generally wrought itself off in two or three days, without great uneasiness, or was cured by some doses of rhubarb. To this succeeded dysenteries, which often proved very tedious, though rarely mortal. The most successful method was to give repeated doses of the ipecacuanna, purges of rhubarb with calomel, which often had the effect of an emetic and an opiate every evening. Other astringent medicines, without these gentle revulsions and evacuations, frequently repeated, were not so effectual in this disease, for they generally retarded the cure.

In October, a pleurisy with its usual symptoms became frequent ; but at this time the pain was mostly external, and increased by touching the part, or lying upon the side affected. The violence and continuance of the pain, the hardness and frequency of the pulse, required

red plentiful and frequent bleeding ; however, the pain was not wholly removed thereby, but afterwards the application of vesicatories, especially on the side affected, afforded great relief. This disease at length degenerated into a pleuritic fever, which lasted most part of the Winter and Spring. In this fever the pain was not so constant or acute as in the pleurisy, but the breathing was more difficult, and the pulse more disorderly, and often low. In the beginning, this disease was pretty obstinate, but not so mortal as it proved afterwards in the spring ; of which more hereafter.

In November, a slow fever prevailed pretty much in town, but much more in some neighbouring villages. It was attended with a violent pain of the head, a small but quick pulse, ravings and watchfulness ; several in an advanced age died of it ; but, of the younger sort, many passed worms by stool and recovered. This fever abated somewhat in January, but in the next month it became more frequent and hazardous than before ; the head-ach was more violent, the ravings more constant, and the watchfulness more obstinate ; to these bad symptoms were added tremulous motions, and startings of the tendons, and sometimes symptomatic bleedings at the nose without relief : In most patients the pulse was little, and frequently in some not much changed from the natural ; and in others, the arteries seemed full but contracted weakly ; the urine was generally pale, and without sediment. These fevers, when allowed their course some days without interruption, were most obstinate to remedies, and

carried off several vigorous young men ; but, in the first days, bleeding and vomiting, and afterwards blistering, did good service, and prevented or abated some of the worst symptoms.

In the interval of this fever, that is, in December and January, there was another frequent among the common people, which always began with a diarrhoea ; if this was neglected in the beginning, it never failed to sink the pulse, and to bring on a delirium and watchings, which could not be removed by blistering, diaphoretic or opiate medicines, but continued obstinate till the tenth or twelfth day, when these patients died : But, when they were early bled and vomited, then opiates had remarkable success, and the patients were well on the fifth or sixth day. At the same time other people had a diarrhoea, without any fever ; but this was easily carried off by the common method of vomiting and purging.

A quinsy likewise was pretty frequent at this time ; it was in most people inflammatory, and attended with a sharp fever, and was cured by plentiful bleeding in the beginning, and blistering ; sometimes also it went off by natural and plentiful sweating after letting blood.

The pleurisy formerly mentioned began in March to rage with greater violence than before, and continued through the two following months. The inflammation seemed to have its seat for most part in the muscles ; for the patients, during the whole disease, could never bear to lie on the affected side ; but a thick, difficult, and painful breathing, a heat and oppression in the breast from the beginning, gave good rea-
son

son to suspect, that a peripneumony was joined to it. Perhaps also in some cases the oesophagus or stomach was slightly inflamed; for many who laboured under this disease had a frequent and strong reaching to vomit, and even bore the operation of a gentle emetic more easily than these throws. The pulse was generally quick and low, but very changeable, and sometimes intermitting; the urine in small quantity, and of a pale colour; the thirst great, and the tongue foul and parched. Upon the first bleeding, the pain was somewhat allayed, the pulse grew fuller and stronger, and the breathing easier; but the return of the former complaints soon required a second, and then a third bleeding, which, however, often sunk the pulse so much, that it was difficult afterwards to raise it to a moderate strength, unless vesicatories were instantly applied, which frequently were of great use, and sometimes brought on a sweat. If this was free and plentiful, it carried off the disease, but, if partial and short, the patients struggled on with pain, inquietude, and agony, till their strength was quite spent.

About this season children were attacked with several diseases, but none of them proved dangerous. Coughs were very universal among children, especially when the east wind blew, or upon the fall of snow; and indeed, through all this winter and spring, persons of all ages have been more subject to coughs than usual. The kink-cough (*tussis convulsiva*) likewise, that had been violent among the children at some distance from town, since the beginning of the year, now advanced to the suburbs, but was very

little felt within the city, as it happens at most other times, however frequent it may be in the country about. Many children at this time got a swelling on the face, neither oedematous, nor very inflammatory, and therefore may be called *erysipelas oedematodes*. Besides children, others likewise had this swelling, which often spread itself over the head, and sometimes seized the arms and lower extremities, where it created a painful itching. Emollient fomentations gave ease; and the swelling was carried off by gentle purging. About the end of March a short but smart fever seized several children, without any topical inflammation: This needed no other cure than a cooling ptisan, or, at most, once bleeding. Some grown persons at this time felt attacks of the rheumatism and *lumbago rheumatica*, which were eased by bleeding, blistering, and warm applications.

In the following months, April and May, scarce any new disease appeared, but the remains of those already mentioned were still to be found, *viz.* The pleurisy, the slow fever, with a head-ach, and some with a diarrhoea, the *erysipelas oedematodes*, the common cough, kink-cough, and ophthalmia; only tertian agues were now epidemic.

AND OBSERVATIONS. 4P

V. An Extract from the public Register of Burials in Edinburgh.

1731.	Men.	Women.	Child.	Still-born.	Sum.
June -	17	27	35	5	84
July - -	19	32	33	5	89
August -	26	26	27	2	81
September	1	30	38	3	88
October	12	19	23	1	55
November	20	27	38	1	86
December	28	23	40	3	94
1732.					
January	36	26	25	3	90
February	35	32	38	3	108
March -	23	31	46	4	104
April -	29	26	58	3	116
May - -	34	34	51	5	124
Total	296	333	452	38	1119

N. B. The above extract is only taken from the records of the City and Cannongate; the numerous suburbs being of design omitted, because of the danger of confounding their burials with those of the country (landward) part of the parishes to which they belong, which there is not sufficient care taken to distinguish in the registers. And, for the same reason, these suburbs are very slightly mentioned in the description of Edinburgh; and no regard is had to them in the calcul of the number of the inhabitants of this city.

VI *An alterative Mercurial Medicine, by ANDREW PLUMMER, M. D. Fellow of the College of Physicians, and Professor of Medicine in the University of Edinburgh.*

ALTHOUGH I am fully satisfied that it is impossible, with any certainty, to attain to the knowledge of the virtue or effects of a new and unknown medicine upon the human body, by reasoning *à priori*; yet I cannot think it inconsistent with this principle to affirm, That certain conclusions, or at least very probable conjectures, may be deduced from the known operations of some medicines, concerning the virtues and effects of others, though untried, when prepared and compounded of such whose powers we have already learned by repeated experiences and constant observations; especially if we are sufficiently informed by chemical experiments of the effects of the bodies employed in the preparation, when applied to one another, and treated in a certain manner. Upon this foot alone it is, that any new production of chemistry can first be introduced into practice among physicians; and this way of reasoning first induced me to make trial of a medicine compounded of *sulphur auratum antimonii* and *calomelas*, with some reasonable hopes of success, in some cases which I am to relate, after I have said somewhat of the medicine itself, its preparation and use.

After that some simple preparations of antimony and mercury had recommended themselves to the observation of physicians, by their
great

great and surprising effects in many obstinate distempers, the chemists every where employed all their art to change these two Herculean medicines into various shapes ; but, as many of their preparations were found too rough and untractable, they sett to work again to refine, subtilize, tame, and correct them, by repeated operations, and the addition of various bodies: But their utmost skill was employed, and their greatest hopes were built, upon the uniting and incorporating antimony and mercury together, separating what they imagined the most noxious or useless parts of these bodies, and combining their most active principles. To these labours of the chemists we owe the *butyrum* and *cinnabaris antimonii*, *mercurius vitæ*, *bezoardicum minerale*, *bezoardicum solare*, *lunare*, *joviale*, several panacæas, and many other preparations, on which the inventors have bestowed the most exorbitant encomiums ; but I am afraid the too officious care of the chemists has rendered many of these preparations altogether unactive, while others remain incorrigible, and unfit for what they were intended.

The medicine which I here offer to consideration, after I have had some experience of its effects, does not come recommended by a pompous title, or by a tedious and perplexed process ; but I hope its simplicity will not prejudice any ingenious person against it : The *sulphur auratum antimonii* and *calomeles*, of which this medicine is compounded, are so well known to every body employed in physic, that I need not here mention their preparations or uses ; only I must take notice, that I prefer Angelus Sala's

la's method of preparing the *fulphur antimonii* to that which is directed in most pharmacopoeias and courses of chemistry. Sala * proceeds in this manner: Reduce antimony to a gross powder, or rather break it into small pieces like grains of barley; separate the finer dust by a sarse, and put the small pieces into a flat-bottomed glass, pouring in *aqua regia* till it rises a finger's breadth above the antimony; let the solution go on without heat, and when there appears a sulphurous or pitchy matter swimming on the liquor, and the antimony is covered with a yellowish crust, gently pour the *aq. reg.* into another vessel, keeping back the sulphurous matter, and wash the remaining antimony several times with fresh water, till it acquires no acidity; then pour upon the *antimony ol. tart. p. d.* to the height of two fingers; place the vessel in warm sand, and increase the fire till the liquor boils; pour out this tincture, and add new *ol. tart.* proceeding as before: To these tinctures or solutions while warm, add distilled vinegar till the effervescence ceases; place the vessel again on warm sand, and a powder will fall to the bottom, which separate by a filtre, and dry upon brown paper. This sulphur, or rather *lac sulphuris antimonii*, Tachenius † imagines is the same that Hel-moc ‡ hints at in some obscure expressions, where he says, The true sulphur of antimony very much resembles common sulphur, only its colour has more of a greenish cast; with this

* Anat. Antim. Part. 2. § 1. cap. 2.

† Hipp. Chem. p. 198.

‡ in verb. Herb. &c. p. 354.

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fulphur he prepares a cinnabar, which, when fix times sublimed and infused in wine, produces most surprising effects: And this cinnabar seems to be the same with the *mercurius diaphoreticus* which he mentions in the same treatise. Tachenius also affirms, that he found by experience this sulphur to be an admirable remedy in the tympany: Of the same he prepares a liniment, with two simples not named, which rubbed upon the spine, wrists, and soles of the feet, infallibly cures tertian agues. Sala likewise reckons this sulphur a powerful aperient, discutient, and sudorific.

I said before, that I preferred the *sulphur antimonii* prepared in the manner now described, to the *sulphur auratum* of the shops; not only upon the authorities just mentioned, but also, because in the common preparation, while the antimony deflagrates with nitre and tartar, much of the true sulphur is consumed, and the powder, which is precipitated from the solution of the scoræ, consists of many of the gross earthy parts of the salts and antimony: But I must own at the same time, that I have not sufficient experience of Helmont's sulphur, for what I have hitherto used in the composition of the medicine of which I am treating, was prepared in the common way.

As for the proportions of the *sulphur auratum* and calomel when I first used this medicine, knowing that my patient was apt to salivate with a small quantity of *mercurius dulcis*, I used *sulph. aurat. antimon. p. iii. calomel. p. ii.* but afterwards I took equal parts of both, and increased or diminished the dose as I thought
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proper. In the composition, I think it is not sufficient simply to mix prepared calomel with the *fulphur auratum*; but, in my opinion, it is better to unite them more intimately, by breaking the calomel to a coarse powder, and adding by degrees the *fulph. aurat.* to levigate them well upon a marble, by which the bright red colour of the *fulph. aurat.* is changed to a dusky brown. I have always used calomel in this preparation, that is, *mercurius dulcis* six times sublimed (besides the sublimation of the *corrosive mercury* with quick silver), as more mild, and less apt to stimulate the guts or dispose the humours to a salivation. What concerns the dose, regimen to be observed, and effects of this medicine, may be easily gathered from the following history.

Some years ago, a lady about thirty, of a slender make and fine skin, being troubled with a *porrigo capitis* with hard and dry crusts, especially on the temples, asked my advice for removing the distemper. After several doses of purgative medicines with calomel, repeated at proper intervals, I put her upon a course of antiscorbutic medicines, and prescribed some applications, as lotions and liniments, to the parts: By the use of these, for some weeks, part of the scurf began to separate; but my patient too soon leaving off the use of the medicines, the disease increased apace. When I was called again, about four months from the first time, I found the scabby crusts had spread themselves all over the scalp, and reached down the forehead to the eye-brows and nose, and along the sides of the face to the ears. Upon
the

the head, these crusts were not every where continued, but in large, thick and hard spots, adhering very firmly to the skin; when rubbed or scratched, they threw off branny scales, but never oozed out any matter. Upon the face, the scurf was thin and white, the skin under it was thicker, and the interstices of the scales appeared redder than usual. There were no scaly spots on other parts of the skin, nor any complaints of sickness or pain, only an itching of the parts affected: The disease at this time had the appearance of the psora or beginning lepra. In this case I judged it necessary to put my patient under a course of mercury; and indeed a small quantity of *mercurius dulcis* in a few days raised a salivation which seemed to me sufficient, and small doses of the same, repeated every second or third day for some time, kept it up at the rate of near three English pints *per diem* for the space of four weeks. Upon the declining of the flux, I ordered her head to be fomented twice a day with a decoction of some of the more fixed kind of antiscorbutic plants, in which soap was dissolved, and the *unguentum antipsoricum cum sulphure* to be rubbed upon it. By this method and the use of the flesh-brush the crusts fell quickly off; and, after the patient's head had been shaved once or twice, the skin appeared perfectly clean and sound, and the hair began to grow as thick and strong as before. Thus the disease seemed to be entirely carried off in the beginning of winter; but, very early in the spring, the scurf began to appear again upon the temples, and very soon to spread itself over the head and to-

wards the face. This quick return of the distemper after a salivation, and some circumstances in the lady's situation at that time, made me bethink myself of some other method of cure. After casting my thoughts upon several things, especially among the antimonial and mercurial medicines, I determined to make a trial of the *sulphur auratum antimonii*; but not having any experience myself of the effects of this medicine, and suspecting its operation might be chiefly on the stomach, I thought its emetic quality might be corrected, partly by making the dose less than is prescribed by authors, and partly by adding to it a small quantity of calomelas, which would either determine its operation downwards, or give it a chance to pass into the blood and penetrate the small canals, without exciting a salivation: But, that I might have some knowledge of the effects of this medicine before I prescribed it to my patient, I resolved to try a dose or two of it upon myself; I took therefore *sulph-aurat. antimonii. p. iii. calomel. p. ii.* and prepared them as above described: In a morning fasting, I swallowed down 5 grains of this powder with a little conserve of roses; this dose did not affect me in any sensible manner; next morning I took $7\frac{1}{2}$ grains of the same, which did not affect me more than the first; therefore, on the third day, I made the dose 10 grains, which indeed gave me a squeamishness and puking for some hours till breakfast, and that day I had a stool more than usual. By these trials I was enabled to make a better judgment of the dose and operation of the medicine I intended to prescribe;

scribe: I ordered therefore a quantity of this powder to be made into pills with the *extractum gentianæ*, adding some drops of the *ol. caryophyl.* and I divided the mass so, that 6 pills should contain 15 grains of the powder; of these the patient was to take 3 in the morning and 3 at night, with a draught of a weak decoction of the *lignum & cortex guaiaci* moderately warm, which she was also to use for ordinary drink; the fomentation and ointment formerly mentioned were renewed, only in place of dissolving soap in the fomentation, I caused *sulphuris flavi contusi unc. sem. sul. tart. drach. iii.* to be boiled in 2 pounds of the decoction.

As my patient at this time was at such a distance from the town that I could not visit her daily, I gave particular directions in case any accident should happen; and, as often as I had opportunity, inquired carefully into the effects of the medicine and progress of the cure. I found the pills gave her no uneasiness, and had no tendency to vomit or purge; and though, as I observed before, she was very easily moved to a salivation by mercury, yet this medicine did not affect her mouth; only about ten days after she began to use the pills, going abroad in a clear frosty day, when a pretty sharp wind blew, she got a slight swelling on her face and a clear thin spitting; however by the warmth of her chamber and bed, having taken the pills as usual, the swelling and spitting were gone by next morning, having sweated more plentifully than usual that night; for while she used this medicine she generally found a gentle moisture

moisture on her skin towards the morning. In the mean time the crusts were falling off apace, insomuch that, in the space of four weeks, or thereby, they were intirely removed, and the lady has now continued near two years without any appearance of the return of the disease.

I had another instance of the good effects of the same medicine in another cutaneous disease.

A person, aged about twenty four, had a considerable foulness of the face from many large red spots and pimples; as this eruption happened suddenly upon taking cold, bleeding, blistering, frequent purges, and a long use of tincture of antimony were tried in the beginning, but with little advantage: Afterwards antiscorbutic juices, gum pills with soap, medicated whey and goat-whey were used for a considerable time with no better success; at length even a six weeks salivation failed of removing these obstinate blemishes. After so many unsuccessful attempts, I at last made a trial of the powder described in the preceding case, of which likewise this patient took 15 grains a-day at twice, and drank plentifully of new-made whey through the day. In the space of two months (in which too there were some interruptions) the face turned smooth and the complexion clear by the use of this medicine, with the assistance only of a gently drying and detergent lotion towards the end. This patient also bore the medicine easily without squeamishness or grippings.

Though I have never depended upon this medicine

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medicine for the cure of the venereal disease from the beginning, yet I have found it in some instances very serviceable in preventing this infection from spreading where I had cause to suspect it was not entirely rooted out by preceding medicines, and in carrying off the dregs of this distemper; for many patients in these cases too soon weary of a close confinement, and frequently break off a course before their physicians are satisfied of their being safe from the infection.

A gentleman, who had been unskilfully treated in a gonorrhoea, and had the running too quickly dried up, several months after, finding himself attacked with worse symptoms of the disease, without having reason to suspect a new infection, asked my advice: At this time he had a large bubo on each groin, and a chancre on the prepuce, which being naturally large and somewhat strait, was a little inflamed, and swelled, and threatened a phymosis; after general evacuations and topics to discuss the swelling on the prepuce, I judged it necessary to raise a salivation by *mercurius dulcis*, which, with proper applications, carried off the chancre; but, seeing no appearance of the bubo's discussing, suppuratives were applied; and, at length, by escharotics we endeavoured to extirpate them: But, before this was entirely completed, the patient being necessarily obliged to go about pressing business, and soon to make a journey into the country, suffered the parts to cicatrize sooner than we intended; however, to prevent as much as possible any bad effects from the cure not being finished to my satisfaction, I prescri-

bed the medicine of which I am here treating in the following manner.

R. Sulph. aurat Antimon. Calomel non pp. a. drach. ii. Calomelas in crassum pulverem redactum lavigetur super marmor, per vices addendo sulph. antimonii portionem, & diuturno tritu fiat pulvis subtilis. Dein,

R Pulver. precedent. unc. sem. gum. guaiac. drach. iii. Resin. guaiac. drach. i. Balsam. capivi q. s. ut fiat massa pilularis, ex cujus singulis drachmis fermentur pilula xii.

I directed my patient to take three of these pills every morning, and as many at night, with a draught of the decoction of the woods, and to drink of it likewise at other times. In the course of some weeks the remains of the bubos were quite gone; although, as my patient afterwards owned to me, it was not possible for him in the country to shun some little irregularities, or to use the decoction, but instead of it he usually drank whey.

A person who had a virulent gonorrhœa and a small bubo on one side became my patient: After the usual directions about diet, drink, &c. and the use of a penetrating fomentation, I began with some doses of *mercurius dulcis*, which was purged off by a dose or two of the *pilule coccia*; thus alternately the doses of mercury and purgatives were repeated three or four times; in the intervals, coolers, balsamics, detergents, were used according to circumstances and symptoms: By these the quantity of the matter was lessened, and its colour and consistence changed to the better; but still there remained some running, and the bubo, though

though small at first, was not much diminished; therefore I ordered the pills described in the preceding case, and a decoction of the woods, which, in twenty days, or thereby, answered my expectations and completed the cure. This patient keeping pretty close at home, and living on a spare cooling diet during the use of the pills and the decoction, sweated plentifully.

To a person troubled with a gleet, which indeed was not very considerable of itself, but had lasted five or six months after the cure of a gonorrhœa, I gave the same pills in the same dose as before, by which, and the use of Bristol water, the gleet was carried off in a fortnight. This patient did not sweat universally, but found a more than ordinary moisture about the inguina and pubis, which smelled somewhat ranker than usual.

These are the principal trials I have hitherto made of this medicine, from which I may be allowed to conclude, That it is not only free from the rougher effects of many mercurial and antimonial preparations, but likewise effectual in removing obstructions formed in some of the remotest and narrowest canals of the body; and in carrying off the recrements of some obstinate distempers, by promoting insensible perspiration or sweat, provided it be prudently managed and assisted by a proper regimen, and other medicines adapted to the circumstances of the patient and disease. But I do not incline to venture too far in assigning the immediate effects of this medicine upon the solids or fluids of the body, or in determining in what other diseases it may be useful.

I have not the vanity, gentlemen, to imagine that the medicine which I have communicated to you deserves to be called a discovery, or that the cases which I have related are, of themselves, worthy to be recorded in your collection: Other physicians, I doubt not, have used *sulphur auratum antimonii*, as an alterative or diaphoretic, and calomel is frequently given in small doses with much the same intention, which might probably have led others in their practice to join these medicines before me; but, as I do not remember to have met with any instances of it, I thought it not inconsistent with your scheme to lay before you the effects which I have observed from the use of this medicine, being persuaded, for my own part, that it is of some importance to physicians to have the true and genuine effects of any medicine, however simple and common it may be, confirmed by certain experiments; and that observations of this kind may be as useful as those which relate only the *prodigia natura*.

VII. *An Account of the Virtues and Use of the mineral Waters near Moffat; by Mr GEORGE MILLIGEN, Surgeon at Moffat.*

THE mineral waters, commonly known by the name of Moffat-waters, arise from two springs or wells separated from one another by a small rock, which lie at the distance of a long mile northwards from the village of Moffat in Annandale, and 36 miles S. W. from Edinburgh. These springs are situated on the declivity of a hill, and on the brow of a precipice,

pice, with many high mountains at some distance, and almost on every side of them; for though the hill, on whose side they are situated, is small, and of an easy ascent, yet it is the second from the plain of a range of hills that rise gradually above one another, and run North towards their summit called Heartfield, one of the highest hills in Scotland: The soil on every side of the wells is thin, and the hills rocky, only just below the wells there is a small moor, caused by the falling of water from the hill above it.

There is a large vein two or three foot thick, of a flinty rock, like what the miners call spar, which runs in one direction for several miles, forms the bottom and lower sides of the wells, crosses obliquely the rivulet at the bottom of the precipice, and ascends the hill on the opposite side. The stones dug out of this vein are a white and grayish spar, having polished and shining surfaces of regular figures, interspersed with many glittering particles of a golden colour, which are very copious and large in some places, especially about the bottom of the wells. Several small veins of the same nature are apparent in the precipices on each side of the rivulet, and several small gushes of water of the mineral kind proceed from them. The rocks and stones about the top of the wells, and in other parts of the hill and precipice, differ not from common stones, no more than the waters of some small springs, in the neighbourhood, do from common water.

There are two medicinal springs, as I have said, very near one another; the higher well lies

lies with its mouth S. E. It is of an irregular square figure, and is about a foot and a half deep. The lower well is surrounded with naked rocks; it forms a small arch of a circle. Its depth is four foot and a half, and the mouth of it faces the East. By a moderate computation, the two springs yield 40 loads of water in 24 hours, each load containing 64 or 68 Scots pints. The water of the higher well is, for the most part, used for bathing, having a more sulphurous and foetid smell than the other; and, by reason of its shallowness, and the looseness of the earth about it, it is not so capable of being kept clean and proper for drinking as the lower well; but as this discharges more than sufficient for that use, it also supplies a great part of the bathing water.

I have no words fully expressive of the taste of these waters; most people who drink them resemble it to something sulphureous, as gunpowder, the scourings of a foul gun, a weak solution of *sal polychrestum*, or *hepar sulphuris*. Some express it by the taste of a rotten egg; but none of these justly come up to the genuine taste of the mineral water. The smell of it indeed nearly resembles that of a foul gun newly discharged. The colour of the water is somewhat milky or blewish, and that of the upper well is most so.

There are a great many legendary stories that pass current with the common people in these parts, about the first discovery of the medicinal virtue of Moffat-wells. What is most generally believed, is, That these waters were observed to be endued with some remarkable properties,

perties, as impregnated with some mineral, by
 a daughter of Bishop Whiteford, who was mar-
 ried to a gentleman of this county, and lived
 within two miles of the wells. This lady, it is
 said, had been, for the recovery of her health,
 at some spaws in England or abroad, and find-
 ing some resemblance between these waters in
 her neighbourhood and those she had used else-
 where, made trial of them, first by drinking,
 and afterwards by bathing in them; and finding
 advantage by both, she recommended the use
 of them to others. Whether she was the first
 that had experienced their medicinal virtue, I
 shall not determine; but we have good reason
 to believe she was among the first, in as much
 as she employed workmen to clear the ground
 about the springs, (their overflowing having
 made a small morass), gave encouragement to
 the poor and advice to others, to make use of a
 medicine which nature had so bounteously of-
 fered to them. This lady was married in the
 year 1633, or the year following; and it is pro-
 bable she was a virgin when she was at the Eng-
 lish or foreign spaws above mentioned; because
 her grandchildren knew nothing of her having
 recourse to any after her marriage; so that it
 may not be many years under a hundred since
 these waters were first used medicinally. In-
 deed the old people here carry the use of the
 wells in a medical way much higher; but, as
 there is no certainty for their traditions, I shall
 pass them over. Certain it is, that these wells
 have had a considerable reputation beyond the
 memory of any now living.

The proper season for using these waters is
 between

between the middle of April and the latter end of September : But some, whose diseases are more obstinate, continue to use them during the whole winter ; for even then, if the weather is fair, or the rains but moderate, the water is little or nothing inferior to its strength in the middle of summer.

The method of using the water externally, is either by bathing the whole body, or some particular diseased part. The ordinary practice of bathing the whole body, is twice, or at the most thrice a week, in the evening, when the dinner may be supposed to be digested. The time of continuing in the bath, is from a quarter of an hour, to a whole hour or more, according to the age, sex, or constitution of the person disordered. The best way is to begin with a few minutes, and gradually to increase the time of continuance in the bath, as the patient finds it to agree with him. The water used in bathing is not now made much warmer than tepid ; and the patients, when they come out of it, rub and dry their skins, and immediately put on their cloaths, without encouraging sweating : Whereas not many years since, the baths were made as hot as one could bear them ; and the patients, after coming out of the water, sweated for a full hour in bed, wrapt up in flannel or blankets. I shall not say but this method may in some cases be very proper ; but, in my opinion, the practice now in use is the more rational, and is, in some measure, warranted by its success in most cases.

The bathing of the whole body is found not to be convenient in inflammations of the face or eyes,

eyes; and therefore most people omit bathing while these inflammations continue; yet I have known several bathe their body, even during the inflammation, without receiving any prejudice. I am however persuaded that it is better at such times to use only half baths, or to bathe no more than the legs. I cannot call to mind any other distemper for which this well is proper, that interferes with bathing; but a great many come to this place, with whom bathing does not agree, on account of their weakness, the unsoundness of their viscera, especially their lungs, or some particularity of constitution.

It is common with such as have ulcers or tumors, to put the part affected into a convenient vessel of warm water, and keep it there for the space of half an hour or thereby, from time to time washing the ulcer, or gently rubbing the tumor. This is their daily practice morning and evening; through the rest of the day they dip linen-rags in the water, and keep them by way of compresses, on the ulcer or tumor, moistening them, as they dry, with the water, which they use either hot or cold. When the ulcer or tumor is so situate, that it cannot be put into the water, they use it by way of foment morning and evening, and apply wet linen-rags, as I hinted before. They have another way of using the water externally, especially when the lips of the ulcer are hard and swollen, they pour the water when it boils into a proper vessel, and place the part affected over it, covering both the vessel and the limb with a piece of thick flannel, to keep in the steam. In hard tumors, and where the sinews are contracted,

tracted, many let the water fall from on high upon the part affected.

The water is commonly drank in the morning between the hours of six and eleven; some both begin and end later: They that allow most time, and drink gradually, take the best method. None is drank after dinner. This water is constantly every day drank by most patients, especially such as stay only three, four, or six weeks. I am however of opinion, even such would reap more benefit, if they sometimes intermitted a day; much more ought some days to be intermitted by those who stay three, four, or six months, and sometimes years.

It is not easy to ascertain the quantity of water commonly drank, people taking more or less as they think it agrees with them; but most people are apt to exceed in the quantity, especially the poorer sort, who frequently drink in one morning three, four, or five Scots pints of water. I remember that, about two years ago, I happened to be at the well about three o'clock in the afternoon, at which time a countryman made an end of his sixteenth pint, I still mean Scots measure; the truth of which I was assured of by several present. The fellow said that he had neither vomited, nor been any other way uneasy, than for a short while troubled with a giddiness of his head. He had been only eight hours in throwing this monstrous quantity into his stomach.

I never prescribe, where I have access to advise, to grown men, more than three chopins, or a quart at most, and this quantity but seldom,

AND OBSERVATIONS. 61

dom, always advising them to begin with a lesser quantity, and increase gradually, till they come to a proper quantum. Women and men of weak constitutions, I seldom advise to drink more than a pint, and that with the restrictions just mentioned. To children, I prescribe according to their age and constitution, from a gill, or half an English pint, to a chopin; or, though very rarely, three English pints. Such as approach to the age of men and women, drink in proportion.

As to preparatory medicines, an emetic or two, and two or three cathartic doses should, in some cases, be given. These doses may be prescribed more or less frequent according to the disease and constitution of the patient. The medicines commonly used during the drinking of the waters, are in the beginning larger doses of *sal glauveri* and *polychrestum*, and afterward lesser quantities; of these two salts I prefer the last for frequent use: Syrup of buck-thorn is often taken along with the water, and Aix-sulphur is pretty much used, and with some agrees very well. There is also a prescription of pills very much in use here; they were ordered by an eminent physician, when he was at the well several years ago, and given by him to an apothecary for a general recipe to all such who should at any time use the water. These pills are a composition of gambogia, resin of jalap, aloes, and (if I mistake not) scammony, which, to all intents, are a strong hydragogue.

And here I cannot but observe a general practice which I can by no means approve, *viz.*

the exorbitant use of purging medicines along with the water. There is nothing more ordinary among the meaner sort, than to take large quantities of common sea-salt in the water, and with those of better condition, to use in like manner what is falsely called Epsom-salt, and is little different from the other; with these, and sometimes with Glauber's salt, they purge themselves briskly. But what makes it yet more unjustifiable, they repeat every day, or every other day, these doses during the whole time of drinking the waters. I do not however dispute against the use of these purges in all cases, since they may be sometimes necessary, as they actually are in the first days of drinking; but only am of opinion, that they should not be so much or so long insisted on. Though I have frequently seen the bad consequences of these methods, I shall only take notice, that, from the strictest observations I have been able to make, I can discover this water to be only an alterant and diuretic. It is true, it generally opens the belly, and with some it purges. As to the first, I believe a quantity of any water might have something of the like effect, though I acknowledge that this does it more than common water, by reason perhaps of the mineral salt in it; yet I cannot find that it operates as a strong or universal cathartic; for, as to its purging with some, I believe that will be found owing to their drinking too large quantities, or to a very lax state of the stomach and intestines, or to some singularity of constitution.

Upon the whole, if the water passes freely by urine, and keeps the belly open, there will be

be less need of any helps; but, till that is effectuated, both cathartics and diuretics should be given. If the water stay in the body long, it will be necessary to let blood, which will facilitate the operation of diuretics, and prevent feverish fits. A small glass of Lisbon wine, in which aromatic and bitter materials have been infused, taken at, or soon after the time of drinking the water, helps weak stomachs to digest it, and prevents that heaviness and inclination to sleep, which tender people complain of, after drinking the water. To women who are hysteric, and men that are much in the same condition with weak stomachs, sinking spirits, &c. I give *sal succini*, either by itself, or mixed with other diuretics, and in such cases, I have always found it to answer very well.

The regimen, during the using of the water, needs not be very strict: Milk, salted meats, eggs, and fish, are not a very proper diet. Riding and moderate exercises assist the water. I need not mention temperance, avoiding colds, &c. After dropping the use of the waters, there is no great necessity in general of taking any medicines; but I shall have occasion below to take notice in what distempers they are most necessary.

The water of Moffat-wells is of great service in grippings of the guts, colics, and pains in the stomach. I need not observe, that bathing in it gives relief in grippings and colic pains, since all tepid baths do the same. I have frequently observed it do great service in bilious and nephritic colics; yea, I have known it cure persons who had been long troubled with

nervous and hysteric colics. It is true, in these disorders, it sometimes fails; but I am persuaded it would succeed better, if such patients insisted less on being purged, by drinking too large quantities of the water, taking too often purging salts with it, or perhaps both; for my part, instead of endeavouring to purge such patients, (except the first day or two, or in cases of necessity), if I find the water have that effect, I frequently give a dose of laudanum at bed-time. I have known drinking and bathing very much lessen or entirely remove pains in the stomach with or without a swelling, even when the distemper had been of long continuance: Of this we have daily instances, as well as of its wonderfully strengthening weak stomachs, recovering the tone of the fibres, and creating an appetite even to such as had long lost all relish for victuals by continual debauches, drinking of spirits, &c. In a word, I believe this water to be second to few medicines in most disorders of the stomach and intestines.

The gravel is another distemper for which this water is very proper, for it frequently carries off great quantities of sand, and clears the urinary passages, curing ischuries, and, if I was not mistaken in the diagnostic, ulcerated kidneys. As to the stony gravel, I do not know that it has done any great service in that case, except perhaps by dislodging the stones from the kidneys, while they were yet small enough to pass through the ureters. I believe it would not be amiss, if such as are troubled with the gravel should drink for some days, both before and after

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after the use of the waters, a decoction of the five opening roots, or some such emollient and diuretic materials.

Some use this water for the gout: I doubt not but it may be of some service, by bettering the stomach and juices; but I cannot vouch for any feats it has done in this distemper.

In the beginning of palsies it has done considerable service: Of this we had instances last summer in two gentlemen, who were troubled with a numbness, and almost total want of feeling, with a great feebleness of all their limbs, especially their legs; after being well purged, they used only the *sal succini* with the water, and that not every day; took a glass of bitters daily, and bathed thrice a week, using the water warm in the evening, and the same again cold next morning; at which time they continued only a few minutes in it. One of these gentlemen was perfectly recovered, and the other became much better: But I believe this water can do no great matters in the great nervous distempers when they are formed; it may, however, with the assistance of other medicines, be a preventer of these terrible maladies, by helping cachexies, sweetning the juices, &c. Many likewise find their account in this water, for bringing down an overgrown and unwieldy habit of body, and carrying off spontaneous lastitudes.

In obstructions of the menses, using half baths is very proper; but I cannot say I have found the drinking of the water answer directly as a provoker of these evacuations, only as it restores the vigour of the stomach, and betters the

the whole constitution, it is useful in such cases. It does service in some hysteric and melancholic ailments; and it is with justice famous for curing barrenness, which it has frequently done to such as were even in despair of having children: And it has been found of great service in all female weakneses, and most other disorders incident to that sex. It is also an excellent remedy in old gleans, whether natural or caused by venereal disorders; only in this last case I would caution every one not to use the water, till they have reason to believe that the venereal taint is removed; for, if it is not, the water will, as effectually as any quack's medicine, throw the distemper into the blood.

Such as are troubled with rheumatic pains and aches, find, both from bathing and drinking, very great relief. Nor is this water a less sovereign remedy to scorbutic patients, many of whom I have seen cured by it; they use it both ways, and many great cures have been brought about, even when the distemper had been of long continuance, when the limbs were monstrously swelled and almost useless, and the skin covered all over with scales, scurf, and scabs: The water however is most to be depended on in the beginning of this disease, after general evacuations, and before it has gone beyond the second stage, as described by Boerhaave in his aphorisms on this subject; for certainly, when the fibres are all relaxed, the body dropical, &c. this water can be little serviceable, if not detrimental: And of this we have yearly instances. It is likewise found to be a very good medicine. used both outwardly and

and inwardly, for the itch, with which the country is pestered; and cures the St Anthony's fire, which perhaps is something a-kin to the scurvy or itch, and is also very frequent here and in the neighbourhood: These roses, as the country people call them, return to many in the spring and autumn, and are introduced by a small fever. In a word, this water is a good medicine in most cutaneous eruptions and foulnesses.

I come now to the king's evil; but, before I make any observations about it, I shall premise, by way of caution, that in this and all other distempers for which people resort to this place, the water is not to be drank while the patient has a cough, even though a slight one, for it seldom fails to increase and bind it: It is also to be prescribed with caution when the patient is hec- tically disposed; and it will most certainly do mischief where there are tubercles or other in- farctions in the lungs. But, these cases only excepted, the water may be used with great freedom.

Before the scrophulous patient begins to make use of the water, he ought to be vomited and well purged; nor would it be amiss for him to take some doses of sweet mercury in the inter- vals of his purging: It is true, many scrophu- lous patients cannot with safety take mercury, and I do not think, that it ought with any to be much or long insisted on; but I have experi- enced that a few doses of it have agreed with many, and promoted the success of the water; to these patients I frequently give some doses of rhubarb by itself, or with two or three grains

grains of calomel, on the days when the drinking of the water is omitted. In these intervals I likewise give antiscorbutic infusions of juices, and, at other such times, emollient and diuretic infusions or decoctions: These may be helps, but the water itself is mostly to be relied on; and, in my opinion, the cure is chiefly owing to the drinking, though, without doubt, the external application is of considerable service in cleaning the sores, easing the pain, healing the ulcers, and otherwise; yet, while the scrophulous humour is in any quantity in the blood, the ulcers either do not heal, or close up fungous, and soon break out again in the same or another place: But, when that venom is thrown out or overcome, all the ulcers heal up surprisingly in a few days; which makes me believe, that the many and great cures performed here upon scrophulous patients, are in a great measure to be ascribed to the drinking of the water. Where the ulcers are foul and fungous, red and yellow precipitate, burnt alum, or some such escharotic powders, are used by themselves or mixed with some ointment for cleaning: To the same purpose are used *ung. Ægyptiacum, bals. virid. &c.* When the lips of the ulcers are inflamed, and the parts round them swelled and hard, besides fomenting with the water, and the other methods of applying it hinted above, there are used emollient fomentations, cataplasms, and various plaisters to the same intent, the best of which I find that to be that made of two parts *gum galbanum*, and one part melilot plaister. This paper would swell to too great a bulk, and perhaps be less suited to your design,

design, if I should give a particular account of the various appearances of this disease in the many scrophulous patients I have seen cured here: I shall therefore only take notice, that it is proper for the scrophulous, after dropping the use of the waters, to recommence purging and mercurial doses for some time, and to persist in the use of emollient and diuretic medicines, and among these chiefly the millipedes.

To conclude all, I can assure you I have never once seen this mineral water fail to cure the scrophulous, when they were able or fit to use it, that is, when the constitution was not quite decayed, or when they were free from the diseases that forbid its use, and when they were willing to allow it a sufficient time, and that is, only a few seasons.

VIII. *Experiments on the Medicinal Waters of Moffat; by ANDREW PLUMMER, M. D. Fellow of the Royal College of Physicians; and Professor of Medicine in the University of Edinburgh.*

HAVING obtained, by the favour of Mr Milligen, a considerable quantity of the mineral water of Moffat, carefully put up at the fountain in the month of April, and a parcel of stones taken from the bottom of the upper well, and some dug from the same vein as it crosses the rivulet below the precipice upon which the wells stand, I thought an attempt to discover the nature of the celebrated mineral water, by a chemical analysis and other experiments of that kind, would not be unacceptable

unacceptable to the curious, and might, in some measure, be useful to illustrate its effects in the cure of diseases.

Above sixty years ago, Mr Mackaile published a topographico-spagyric description of Moffat-wells; in which he concludes, but from very precarious principles, that this water is impregnated with the putrid sulphur of antimony and nitre; but in another place he thinks it necessary to add to these natural *sal ammoniac*: This gentleman indeed writes in the dialect of an adept, but most unlike a true chemist, declares against experiments, and asserts, that an analysis of the water would be to no purpose, and therefore never made the trial. I shall not trouble the reader with any further remarks on this author, but shall impartially relate the experiments I made on this water, and the stones taken from the vein on which it runs.

The mineral water tried by the hydrostatical balance at the fountain, and compared with the water of a rivulet near the well, was found somewhat lighter than it; for the specific gravity of the mineral water was to that of the other water as 838 to 840.

The mineral water brought from Moffat to Edinburgh, in bottles well corked and waxed about the neck, had a strong sulphurous smell, but appeared equally limpid and clear as common spring-water, though at the fountain it has a milky or bluish colour: Upon the first opening of the bottle the water tasted as strong, to my sense, as when I have drank it at the well; but next day, the bottle being half empty, the water

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water had quite lost its distinguishing taste and smell.

I put some grains of the fresh powder of galls into a small quantity of the water, but it did not strike a black or violent tincture therewith, though I set the glass in a sand-heat for some hours. A strong infusion of red roses in common water poured into an equal quantity of the mineral water, was only diluted and made fainter, as if so much simple water had been added to the infusion, and the same happened with syrup of violets. This water then gave no marks of chalybeate nature with galls, nor of acidity with tincture of roses, or syrup of violets; neither did it produce any effervescence with alkaline liquours, as *ol. tartar. p. d.* or *spir. sal. ammoniac.* only, when the first was dropped into the water, there appeared a faint blue cloud suspended in it. Acid liquors, as *sp. et ol. vitriol. sp. nitr. &c.* added to these mixtures with alcalis, after an effervescence, produced a milky colour, but no precipitation. The same acid liquors dropped into the simple mineral water made no sensible effervescence, only the mixture with *sp. nitri* smoked a little, and some bubbles of air rose from the bottom, but all of them turned the water more or less milky. These phenomena discover the sulphureous nature of the water, but this sulphur must be very subtile, volatile, and in small quantity, seeing the water exposed to the air soon loses that smell and taste which at first so remarkably affected the organs of these senses; and seeing acid liquors cannot so unite the particles of this sulphur as to make them

fall to the bottom, or separate from the water.

I made a great many attempts to fix this sulphur, and render it conspicuous, but without success, and therefore I shall not trouble the reader with these fruitless experiments; only there is one which had almost led me into a mistake, until, by further prosecuting the experiment, I discovered the truth: But having spoke of this matter to some gentlemen before I knew my error, I must take this opportunity to relate the whole matter. Having put a few grains of *saccharum* or *vitriolum saturni* (made with *aq. fort. simpl.* diluted with a triple quantity of common water and litharge) into two ounces of Moffat water, this presently turned of a reddish colour, after standing some minutes, the water grew more pellucid, and the red particles uniting, fell mostly to the bottom, and some small flakes swam on the surface: This matter separated from the water resembled the *sulphur auratum antimonii*; and indeed I imagined that this was the sulphur which impregnates the water coagulated and fixed. That I might therefore procure a sufficient quantity of this matter to discover its nature by other trials, I got a fresh parcel of mineral water from Moffat, and repeated the experiment: I put 3 drams of the *vitriolum saturni* by degrees into 3 chopins or English quarts of the water, and poured the muddy liquor into a filter, in which there remained a powder not so red as in the former experiment, but of a brownish colour, which when dry weighed 20 grains. I put 5 grains of this powder upon an iron-plate made red hot, it

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soon melted and smoked a little, but did not flame; when the iron was cold I found upon it a thin scurf of lead. Upon the rest of this powder I poured some *ol. tartar. p. d.* and set the glass to digest on a sand-heat, but the liquor acquired no tincture as it would have done from a sulphureous substance: So that in this experiment the acid of the *vitriolum saturni* mixing with the water, had let fall some of the particles of the litharge, which by fire afterwards returned to lead. That I might know what remained in the water which had passed through the filter, I put about the half of it into an iron kettle, to evaporate it in haste, and I got a drachm and 5 grains of a saline or vitriolic substance, of a brown colour, and not so sweet and styptic to the taste as the *vitriolum saturni*, which was dissolved in the water. The difference, I presume, was owing partly to some of the litharge being precipitated, partly to the iron kettle in which it was boiled, and lastly to some of the proper salt of the water, being united to this vitriolic substance..

Twelve Scots pints of the mineral water was distilled with a gentle heat, from glass vessels, with the joinings luted; the water which came over was perfectly limpid, and had no smell or taste, but a little empyreuma; what remained in the body had no smell either, but tasted somewhat saltish. When $\frac{3}{4}$ or thereby was brought over, there appeared at the bottom a good quantity of muddy sediment, which I separated from the liquor, and carried on the evaporation in a low wide mouthed glass. When the water was reduced to somewhat less

than a chopin, it seemed well saturated with a salt; for it was thick and bubbled, as when a lixivial salt is boiled near to dryness. When all was cold, I found at the bottom a dirty salt, mixed with mud or earth; the saline particles were so very small, that I could not observe their shapes; but the liquor had a very briny or muriatic taste. I proceeded to evaporate and crystalize the remaining liquor, (except two ounces reserved for other trials) till I gathered all the salt, which weighed 4 drachms and 2 scruples. As this salt was very brown and earthy, I dissolved in some of the distilled water, filtered the solution, and crystalized it again; then there appeared very clean and beautiful crystals, of an uncommon figure, of very different sizes, but almost exactly similar; some of which are represented of their natural bigness on plate I.

Fig. I. Shews a small crystal, but very complete and regular.

Fig. 2. Represents one of the largest, somewhat rugged at the corners.

Fig. 5. Is the reverse of the former, shewing its stalk.

Fig. 3. Shews two joined by one side.

Fig. 4. Represents 2 irregularly blended.

Each of these crystals is made up, as it were, of four triangles joined together, so as to make up a little hollow capsule or dish, with brims turned outward or horizontally, and stands upon a little pedestal or stalk. Besides these crystals there were others of a cubical shape, but both sorts had evidently the taste of sea salt.

I put two drachms of the salt obtained from

Mossat

Moffat water into an iron laddle, and set it on a clear fire, till the iron was red hot; the salt smoked and crackled much as in the decrepitation of common salt, but it neither melted nor flamed, nor did it much diminish in weight; for, after an hour's toasting, it had only lost 18 grains; which makes it evident that this salt is neither *nitre* nor *sal ammoniac*.

This decrepitate salt, with four scruples of the salt which had not felt the fire, was put into a small glass retort, and, a drachm of oil of vitriol poured upon it, there arose copious fumes, which were immediately confined, by applying a receiver: The distillation was carried on with a fire gradually increased, the receiver was filled with white fumes, and there came over about two drachms of a volatile smoking spirit, which answered all the characters of Glauber's spirit of sea salt.

Having dissolved some silver in *aqua fortis*, I divided the solution into several portions; into one I let fall some drops of the spirit above described; into another I put some grains of the salt of Moffat water, into a third some of the water evaporated to $\frac{1}{36}$, and each of these made a precipitation of the silver. All which plainly show that this water is impregnated with common salt or sal-gem. Altho' the saline crystals obtained from Moffat water differ very much in appearance from the sea salt commonly used, yet having dissolved some common salt in pure water, after filtration, and a very slow evaporation, I observed many of the saline particles assume a shape not unlike that described above; but the crystals of the com-

mon salt approached nearer to little hollow pyramids, with square bases.

I mentioned before that I had reserved two ounces of the water, when it was evaporated to $\frac{1}{10}$ or thereby, and was strongly impregnated with salt. Into a small quantity of this brine (as I may call it) I let fall some drops of *ol. tartar. p. d.* which caused no effervescence, which presently produced a milky colour and coagulation; upon standing a while, the upper part of the liquor turned clear, and of a whey colour. The same happened when *spir. sal. ammon. cum alcal. fixo* was dropt into another small parcel of the same water; some drops of *spir. vitriol.* put into these mixtures, after effervescence, dissolved the coagulation, and rendered the liquor pullucid: But *sp. vitriol.* or other acid liquors dropt into the brine by itself, caused no effervescence, or other change in colour or consistence. The difference between these phænomena and those formerly observed in the fresh water, upon mixing the same liquors, is remarkable; for, when acid spirits were dropt into the fresh water, they always turned it milky, because then the water was impregnated with its sulphur, which the acid liquors, in some measure, coagulated so as to change the colour of the water: But alkaline liquors added to the fresh water produced little change, because a small quantity of salt was dispersed through a great bulk of water. On the other hand, when the sulphur was carried off by heat, and the salt gathered into narrower bounds, then the acids had no effect, but the alcalis had a considerable one, by joining

ing themselves to the particles of salt, and collecting them together.

The muddy sediment which was at first separated from the water, when dry, weighed 25 grains; it was of a sandy colour, and had a little saltiness on the tongue. I put this powder into an iron spoon, made red hot, and kept it on the fire; it smoked a little, turned black on the surface, afterwards red, and at last perfectly white. When cold it weighed 17 grains, and felt like chalk.

The earth which was separated from the solution of the salt by filtration, weighed 15 grains. It had no saltiness, but was more gritty between the teeth than the former. When calcined, it smoked little; scarce changed its colour, and, when cold, weighed 10 grains.

I poured upon small parcels of these earthy substances both acid and alkaline liquors; but the remains were so small, that I could not discover whether they contained any metallic particles or not.

The stones dug from the vein, as it passes thro' the bottom of the upper well at Moffat, are made up partly of a crystalline spar, cut, as it were, into many polished surfaces like diamonds, partly of a shining substance of a golden colour, but mostly of a dusky or leadish-coloured ore.

Though these stones seemed to abound in sulphur, yet none of it would sublime in close vessels; but, to obtain it in some shape, I poured upon two ounces of the ore in powder a solution of salt of tartar; by digestion this extracted a very deep-red tincture, from which
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by pouring in *spir. vitriol.* I got a powder of a citron colour, weighing 17 grains, which put upon a red-hot iron made a faint blue flame, and had a sulphureous smell.

Two ounces of the same mineral, mixed with an equal quantity of tartar and nitre in powder, was put into a red-hot crucible in a melting surface; after half an hour's fusion, the matter was thrown into an hollow cone, or antimonial horn, it did not separate into a metallic or reguline part and scoriæ; but there appeared many shining particles dispersed thro' the mass, like very foul antimony. The whole was again reduced to a powder, and water poured on it, which acquired a very foetid and sulphureous smell, and a taste much resembling the fresh mineral water, but much stronger. This water likewise, with spirit of vitriol, afforded a sulphur like the former. The metallic matter, freed from the salts by frequent washing, was again brought to fusion with nitre and tartar, and now I find at the apex of the cone, a piece of very pure copper, weighing 42 grains, which answered all the characters of that metal.

I acknowledge that I could not discover any marks of copper in the water itself, by any trials I could make; but as this water washes a vein abounding with copper and sulphur, and is itself impregnated with salt, I may conclude that the principles contained in this medicinal water, are a very subtile and volatile sulphur, at least some constituent parts of sulphur, some particles of copper and *sal-gem*, or common salt.

IX. *An ESSAY on the Art of injecting the Vessels of Animals*; by ALEXANDER MONRO, Professor of Anatomy in the University of Edinburgh, and F. R. S.

THE method of filling the vessels of animals with a coloured liquor, which afterwards hardens, and, by keeping the vessels distended and firm, gives an opportunity of observing more exactly their distribution, situation, and diameters, and of discovering numbers of their branches and communications that would otherwise be unsearchable, is a modern improvement, that has contributed considerably to explain the animal oeconomy. Anatomists are now sufficiently acquainted with the manner of filling the larger trunks; but few have hit on the art of injecting the very small capillary tubes; wherefore I hope it will not be unacceptable to give you a detail of what I have found, after a considerable number of different trials, to have succeeded best in this way of injection, which may at least have one good effect, though I should fail of being the discoverer of this art, namely, of saving unnecessary trouble to other inquirers after it, and may spur on some other more lucky person to communicate the whole of it, by which, more anatomists being employed in searching out the minute vessels, more discoveries may be made, than when it is confined to so few as it is at present.

In describing the trials I have made to succeed in subtil injections, I can scarce help mentioning

tioning several things which are commonly known to all who practise injections of any kind; and I shall be the less anxious to thum them, that scarce any anatomical books describe with accuracy the method of injecting; and therefore this essay may save the young unexperienced anatomist the trouble of fruitless trials, which I beg you will accept of as an apology for repeating things that have been long familiar to you.

The instrument with which the liquor is commonly thrown into the vessels is, you know, a tight easy-going syringe of brass, to which several short pipes are fitted, and can be fixed by screws, the other extremities of these pipes being of different diameters without any screw, that they may slide into other pipes which are so exactly adapted to them at one end, that, when they are pressed a little together, nothing can pass between them: And because their cohesion is not so great as to resist the pushing force of the injection, which would drive off this second pipe, and spoil the whole operation; therefore the extremity of this second sort of pipes, which receives the first kind, is formed on the outside into a square, bounded behind and before by a rising circle, which hinders the key that closely grasps the square part from sliding backwards or forwards; or a bar of brass must stand out from each side of it to be held with the fingers. The other extremity of each of these second sort of pipes is of different diameter, and near it a circular notch, capable of allowing a thread to be sunk into it, is formed; by this the thread tying the vessel at
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which the injection is to be made, will not be allowed to slide off.

Besides this form described, common to all this second sort of pipes, we ought to have some of the larger ones with an additional mechanism for particular purposes; as for instance, when the larger vessels are injected, the pipe fastened in the vessel ought either to have a valve or a stop-cock that may be turned at pleasure, to hinder any thing to get out from the vessel by the pipe; otherwise, as the injection in such a case takes time to coagulate, the people employed in making the injection must either continue all that while in the same posture; or, if the syringe is too soon taken off, the injected liquor runs out, and the larger vessels are emptied. When the syringe is not large enough to hold at once all the liquor necessary to fill the vessels, there is a necessity of filling it again: If, in order to do this, the syringe was to be taken off from the pipe fixed in the vessel, some of the injection would be lost, and what was exposed to the air would cool and harden; therefore some of the pipes ought to have a reflected curve tube coming out of their side, with a valve so disposed that no liquor can come from the straight pipe into the crooked one, but, on the contrary, may be allowed to pass from the crooked to the straight one; the injector, then taking care to keep the extremity of the reflected pipe immersed in the liquor to be injected, may, as soon as he has pushed out the first syringe full, fill it again by only drawing back the sucker, and, repeating
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this quickly, will be able to throw several syringe-fulls into the vessels.

All these different sorts of pipes are commonly made of brass.

The liquors thrown into the vessels with a design to fill the small capillary tubes are either such as will incorporate with water, or such as are oily; both kinds have their advantages and inconveniencies, which I shall mention in treating of each, and shall conclude with that which I have found by experience to succeed best.

All the different kinds of glue, or ichthyocola, fyths, common glue, &c. dissolved and pretty much diluted, mix easily with the animal fluids, which is of great advantage, and will pass into very small vessels of a well-chosen and prepared subject, and often answer the intention sufficiently, where the design is only to prepare some very fine membrane, on which no vessels can be expected to be seen so large as the eye can discover whether the transverse sections of the vessels would be circular, or if their sides are collapsed. But, when the larger vessels are also to be prepared, there is a manifest disadvantage to the usefulness and beauty of the preparation; for, if nothing but the glutinous liquor is injected, one cannot keep a subject so long as the glue takes of becoming firm; and therefore, in dissecting the injected part, several vessels will probably be cut and emptied: To prevent this, one may indeed either soak the part well in alcohol, which coagulates the glue; but then it becomes so brittle, that the least handling makes it crack; and if the preparation

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paration is to be kept, the larger vessels appear quite shriveled, when the watery part of the injection is evaporated ; or the efflux of the injection may be prevented by carefully tying every vessel before we are obliged to cut it ; still however that does not hinder the vessels to contract when the glue is drying. If, to obviate these difficulties, the glutinous liquor should first be injected in such quantity as the capillary vessels will contain, and the common oily or waxy injection is pushed in afterwards to keep the larger vessels distended ; the wax is very apt to harden before it has run far enough ; the two sorts of liquors never miss to mix irregularly, and the whole appears interrupted and broken by their soon separating from each other ; which is still more remarkable afterwards, when the watery particles are evaporated.

Spirits of wine coloured mixes with water and oils, and so far is proper to fill the very small vessels with ; but, on the other hand, it coagulates any of our liquors it meets, which sometimes block up the vessels so much, that no more injection will pass ; then it scarce will suspend some of the powders that prove the most durable colours ; and, as it entirely evaporates, the vessels must become very small ; and the small quantity of powder left, having nothing to serve for connecting its particles together, generally is seen so interrupted, that the small ramifications of vessels rather have the appearances of random scratches of a pencil, than of regular continued canals.

Melted tallow, with a little mixture of oil of turpentine, may sometimes be made to fill

very small vessels, and keeps the larger ones at a full stretch; but, where any quantity of the animal liquors are still in the vessels, it is liable to stop too soon, and never can be introduced into numbers of vessels which other liquors enter; and it is so brittle that very little handling makes it crack, and thereby renders the preparation very ugly*.

The method I have always succeeded best with, in making what may be called subtile or fine injections, is, first to throw in coloured oil of turpentine, in such a quantity as might fill the very small vessels, and, immediately after, to push the common coarse injection into the larger ones. The oil is subtile enough to enter rather smaller capillary tubes than any colouring can; its resinous parts, which remain after the spiritous are evaporated, give a sufficient adhesion to the particles of the substance with which it is coloured, to keep them from separating, and it intimately incorporates with the coarser injection, by which, if the injection is rightly managed, it is impossible for the sharpest eye to discover that two sorts have been made use of †.

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* *Rigierus* (introducitur, in notitium rerum natur. et arte facta Hagae 1743. titul. balsamum) gives Ruysch's method of injecting and preserving animals, which, he says Mr Blumentrost, president of the Petersburg academy, assured him was copied from the receipt given in Ruysch's own hand-writing to the Czar. According to this receipt, melted tallow, coloured with vermilion, to which, in the summer, a little white wax was added, was Ruysch's injecting *seracea materies*.

† Mr Ranby's injecting matter, as published by Dr Hales, *Memast. Ex. 21.* is white rosin and tallow of each two Ounces

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All the liquors with which the vessels of animals are artificially filled, having very faint and near the same colours, would not at all appear in the very small vessels, because of their becoming entirely diaphanous, without a mixture of some substance to impart its colour to them, and where several sorts of even the larger vessels of any part were filled, one sort could not be distinguished from another, unless the colour of each was different; which has likewise a good effect in making preparations more beautiful. Wherefore anatomists have made use of a variety of such substances, according to their different fancies or intentions, such as gamboge, saffron, ink, burnt ivory, &c. which can be easily procured from painters. My design being only to consider those that are fit to be mixed with the injecting liquors proposed to fill capillary vessels, which is scarce ever to be done in any other, except the branches of the arteries and of some veins, I shall confine myself to the common colours employed to these last named two sorts of vessels, which colours are red, green, and sometimes blue, without mentioning the others which require very little choice.

Anatomists have, I imagine, proposed to imitate the natural colours of the arteries and veins in a living creature, by filling the arteries with a red substance, and the veins with a blue or green; from which however there are o-

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ounces, melted and strained through linen, to which was added three ounces of vermilion, or finely ground indigo, which was first well rubbed with eight ounces of turpentine varnish,

ther advantages, such as the strong reflection which such bodies make of the rays of light, and the unaptness most such bodies have to transmit these same rays, without, at least, a considerable reflexion of the rays peculiar to themselves, or, in other words, their unsitnes to become compleatly pellucid; without which the very fine vessels, after being injected, would still be imperceptible. The animal or vegetable substances made use of for colouring injections, such as chochineal, laque, *rad. anchusia*, brazil-wood, indigo, &c. have all one general fault of being liable to run into little knots which stop some of the vessels; their colour fades sooner when kept dry; they more easily yield their tincture when the parts are preserved in a liquor; and rats, mice and insects will take them for food; for which reasons, though I have frequently succeeded in injecting them, I rather prefer the mineral kind, such as minium or vermilion for red, of which this last is, in my opinion, the best, because it gives the brightest colour, and 'tis commonly to be bought finely levigated. The green coloured powder generally used is verdigrease; but I rather chuse that preparation of it, called *distilled verdigrease*; because its colour is brighter, and it does not so often run into small knots as the common verdigrease, but dissolves in the oily liquors.

The method of preparing the injection composed of these materials is, to take, for the fine one, a pound of clear oil of turpentine, which is gradually poured on three ounces of vermilion or distilled verdigrease finely powdered, or rather well levigated by grinding on marble; stir
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them well with a small wooden spatula till they are exactly mixed, then strain all through a fine linen rag: The separation of the grosser particles is, however, rather better made, by pouring some ounces of the oil upon the powder, and, after stirring them together strongly, stop rubbing with the spatula for a second or so, and pour off into a clean vessel the oil with the vermilion or verdigrease suspended in it; and continue this sort of operation till you observe no more of the powder come off, and all that remains is granulated. The coarser injection is thus prepared: Take tallow, 1 pound, wax, bleached white, five ounces, salad oil, 3 ounces, melt them in a skillet put over a lamp; then add Venice turpentine, 2 ounces; and, as soon as this is dissolved, gradually sprinkle in of vermilion or verdigrease prepared, 3 ounces; then pass all through a clean dry, warmed lincloth, to separate all the grosser particles; and, when you design to make it run far into the vessels, some oil of turpentine may be added immediately before it is used.

The next thing to be considered, and indeed what chiefly contributes to the success of injections, is, the choice and preparation of the subject whose vessels are to be filled.

In chusing a fit subject, take these few general rules: 1. The younger the creature to be injected is, the injection will, *ceteris paribus*, go farthest, and *vice versa*. 2. The more the creature's fluids have been dissolved and exhausted in life, the success of the operation will be greater. 3. The less solid the part designed to be injected is, the more vessels will be filled.

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4. The more membranous and transparent parts are, the injection shows better. Whereas, in the solid very hard parts of a rigid old creature, that has died with its vessels full of thick strong blood, it is scarce possible to inject great numbers of small vessels.

Therefore, in preparing a subject for injecting, the principal things to be aimed at, are, To dissolve the fluids, empty the vessels of them, relax the solids, and prevent the injection's coagulating too soon. To answer all these intentions, authors have proposed to inject tepid or warm water by the arteries, till it returns clear and untinged by the veins, and the vessels are thereby so emptied of blood, that all the parts appear white, after which they push out the water by forcing in air: And, lastly, by pressing with their hands, they squeeze the air also out. After this preparation, one can indeed inject very subtilly, but generally there are inconveniencies attend it; for, in all the parts where there is a remarkable *tunica cellulosa*, it never misses to be full of the water, which is apt to spoil any parts designed to be preserved either wet or dry; and some particles of the water seldom miss to be mixed in the larger as well as smaller vessels with the oily injection, and make it appear discontinued and broken: Wherefore it is much better to let this injection of water alone, if it can be possibly avoided, and rather to macerate the body or part to be injected a considerable time in water made so warm * as one can hold his hand

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* Ruysch orders a previous maceration for a day or two in cold water, which must have a better effect in melting the blood than warm water has.

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easily in it; taking care to keep it of an equal warmth all the time, by taking out some of the water as it cools, and pouring in hot water in its place; by which the vessels will be sufficiently softened and relaxed, the blood will be melted down, and the injection can be in no danger of hardening too soon; whereas, if the water is too hot, the vessels shrink, and the blood coagulates: From time to time, we squeeze out the liquids as much as possible at the cut vessel by which the injection is to be thrown in*. The time this maceration is to be continued, is always in proportion to the age of the subject, the bulk and thickness of what we design to inject, and the quantity of blood we observe in the vessels, which can only be learned by experience; at least, however, care ought to be taken, that the whole subject or part macerated is perfectly well warmed all through: and that we continue the pressure with our hands, till no more blood can be brought away, whatever position we put the subject in.

When the syringe, injections, and subject are all in readiness, one of the second sort of pipes is chosen, as near to the diameter of the vessel by which the injection is to be thrown as possible; for, if the pipe is too large, it is almost needless to tell it cannot be introduced. If the pipe is much smaller than the vessel, it is scarce possible to tie them so firmly together, but, by the wrinkling of the coats of the vessel, some small passage will be left, by which part of

* When Ruysch intended to inject the whole body, he put one pipe upwards, and another downwards, in the descending aorta.

of the injection will spring back on the injector, in the time of the operation, and the nearest vessels remain afterwards undistended, by the loss of the quantity that ouzes out. Having chosen a fit pipe, it is introduced at the cut orifice of the vessel, or at an incision made in the side of it; and then a waxed thread being brought round the vessel, as near to its coats as possible, by the help of a needle, or a flexible eye'd probe, the surgeon's knot is made with the thread, and it is drawn as firmly as the thread can allow; taking care that it shall be sunk into the circular notch of the pipe, all round, otherwise it will very easily slide off, and the pipe will be brought out probably in the time of the operation, which ruins it.

If there have been large vessels cut, which communicate with the vessels you design to inject, or if there are any others proceeding from the same trunk, which you do not resolve to fill, let them be all carefully now tied up, to save the injected liquor, and make the operation succeed better in the view you then have.

When all this is done, both sorts of injections are to be warmed over a lamp, taking care to stir them constantly, lest the colouring powder fall to the bottom and burn*. The oil of turpentine needs be made no warmer than will allow the finger to remain in it, if the subject has been previously well warmed in water, when the maceration has not been made, the oil ought to be scalding hot, that it may warm all the parts which are designed

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* Ruysch melts his tallow by the heat of warm water, into which he puts the vessel containing the injection.

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to be injected. The coarse injection ought to be brought near to a boiling. In the mean time, having wrapt several folds of linen round the parts of the syringe which the operator is to grip, and secured the linen with thread; the syringe is to be made very hot, by sucking boiling water several times up*, and the pipe within the vessel is to be warmed by applying a sponge dipped in boiling water to it †.

After all is ready, the syringe being cleared of the water, the injector fills it with the finer injection, and then introducing the pipe of the syringe into that in the vessel, he presses them together, and either with one hand holds this last pipe firm, with the other grips the syringe, and with his breast pushes the sucker; or, giving the pipe in the vessel to be held by an assistant, in any of the ways mentioned in the description of these sort of pipes, he grips the syringe with one hand, and pushes the sucker with the other, and consequently throws in the injection, which ought to be done slowly, and with no great force, but proportioned to the length and bulk of the part to be injected, and strength of the vessels. The quantity of this fine injection to be thrown in is much to be learned by use. The only rule I could ever fix to myself in this matter, was to continue pushing till I was sensible of a stop, which would require a considerable force to overcome. But this will not

* He warms his syringe by laying it on hot coals.

† He warms his pipe, by putting the body, after the pipe is fixed in the vessel, into hot water. When this is to be done, a cork ought to be put into the pipe, to prevent the water getting into the vessel that is to be injected.

not hold where all the branches of any vessel are not injected; as for instance, when the vessels of the thorax only are to be injected; for the aorta bears too great a proportion to the branches sent from it, and therefore less fine injection is requisite here. As soon as that stop is felt, the sucker of the syringe is to be drawn back, that the nearest large vessels may be emptied. Then the syringe is taken off, emptied of the fine injection, and filled with the coarser, which is to be pushed into the vessels quickly and forcibly, having always regard to the strength and firmness of the vessels, bulk, &c. of the part. Continue to thrust the sucker, till a full stop, or a sort of push backwards is felt, when you must beware of thrusting any more, otherwise some of the vessels will be bursted, and the whole, or a considerable share of the preparation you designed, will be spoiled by the extravasation; but rather immediately stop the pipe by the turn-cock, and take out the syringe to clean it, and allow sufficient time for the coarse injection to coagulate fully, before any part is dissected*.

In this way I have frequently injected the cortical part of the brain, *tunica choroides* and *vasculosa* of the eye, periosteum of the bones of the ear, vessels of the teeth, of the skin, bones, and viscera; which any of you, gentlemen, may satisfy yourselves of when you please, by seeing them. As a specimen of the success of this way I have sent you herewith the fi-

* Ruyseh, immediately after throwing in the injection, put the body into cold water, and stirred it continually for some time, to prevent the vermilion to separate from the tallow.

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gure of a little piece of the *tunica villosa* of the intestines, at least of that membrane which retains the air in the internal cellular coat of the intestines, when they are turned inside out; and these cellules are distended by blowing. In *tab. 1. fig. 6.* you see this piece of membrane, as it appears to the naked eye; only that the deep red colour, with which it is tinged all over in the original, cannot appear here. In *fig. 7.* is represented the appearance it had when viewed with a microscope. What looks like a sort of moss-work here, shews itself vascular, when it is viewed with a microscope that magnifies more than the one employed when the painter drew this figure.

X. *A Demonstration of the strength of Bones to resist Powers applied to break them transversely, by Dr WILLIAM PORTERFIELD, Fellow of the Royal College of Physicians in Edinburgh.*

“ Gentlemen,

IN the the second edition of my *Anatomy of the human Bones*, just now printed, after demonstrating, that the resistance of two cylindrical bones of unequal diameters, but consisting of an equal number of similar fibres, uniformly disposed round each, to forces applied to break them transversely, will be proportional to their diameters, I affirm, in page 28, That, of whatever figure bones are, and in whatever manner their fibres are disposed, their strength must always be in a ratio compounded of their quantity of bony mater, and of the distance of their center

center of gravity, from the center of motion. My worthy friend Dr Porterfield, who always examines accurately what he reads, having, to satisfy himself, drawn up, not only a demonstration of that proposition; but having also considered the resistances of bones in a great many more different views than I think our writers in mechanics commonly do the forces of bodies; and having accidentally let me see the inclosed paper, I prevailed on him to allow me send it you, as justly, in my opinion, deserving a place in your collection; and being an excellent supplement to that part of my Osteology. I am

Your most obedient servant,

ALEX. MONRO."

LEMMA.

THE sum of the actions of two or more agents, conspiring to act in parallel lines, is always as the sum of their absolute forces, multiplied into the velocity of their common center of gravity.

DEMONSTRATION.

Let A, B, (*tab. 1. fig. 8.*) represent the absolute force of the agents A and B, whose common center of gravity is C; and let the parallel lines Aa, Bb, Cc, represent the velocities and directions of the agent A, the agent B, and their common center of gravity C, respectively: The action of agents being always as rectangles, under their absolute forces and velocities,

velocities: The action of A, shall be $A \times Aa$, the action of B, $B \times Bb$; the sum of their actions $A \times Aa + B \times Bb$, and the sum of their absolute forces multiplied into the velocity of their common centre of gravity, $A \times Cc + B \times Cc$. I say, $A \times Aa + B \times Bb = A \times Cc + B \times Cc$.

Case 1. If the velocities Aa and Bb are equal, they shall also be equal to Cc ; if therefore Cc be substituted in place of Aa and Bb , the sum of the actions shall be $A \times Cc + B \times Cc$; but this also is the sum of the absolute forces multiplied into the velocity of their common centre of gravity, and therefore they are equal.

Case 2. If the velocities are unequal, let Aa be less than Bb ; draw the line ac , parallel to AB , cutting Cc in f ; Aa , Cf , Be shall be equal, which call v . Let $fc = x$, and $eb = z$, hence Cc shall be $=v+x$, and $Bb = v+z$; The sum of the actions shall be $Av + Bv + Bz$, and the sum of the absolute forces multiplied into the velocity of their common centre of gravity shall be $Av + Bv + Ax + Bx$; which two last we contend are equal.

From the definition of the centre of gravity $ac : cb :: B : A$, and by composition $ac : ac + cb$, that is, $ab :: B : B + A$; but (because of the similar triangles afc , aeb) $x : z :: ac : ab$; therefore $x : z :: B : B + A$; hence $Bz = Ax + Bx$; and therefore $Av + Bv + Bz = Av + Bv + Ax + Bx$, that is, the sum of the actions of the agents A and B is equal to the sum of their absolute forces, multiplied

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into the velocity of their common centre of gravity.

Case 3. If the number of agents be greater than two; let them be supposed three. By *Case 1.* and *2.* the sum of the actions of two of them is equal to what would arise, did both coalesce in one, and move with the velocity of their common centre of gravity. Hence the number of agents are reduced to two, and consequently fall under what has been above demonstrated. By the same way of proceeding, 3, 4, 5, or any given number of agents, may (without altering their joint force or action) be supposed to coalesce and move with the velocity of their common centre of gravity; and therefore, universally, the sum of the actions of any number of agents, conspiring to act in parallel lines, is always as the sum of their absolute forces multiplied into the velocity of their common centre of gravity. Q.E.D.

C O R O L L A R Y.

Action and reaction being equal, it follows, that the total resistance of any number of powers resisting in parallel directions, is always as the sum of their absolute resisting forces (whether arising from attrition, cohesion, weight, attraction, or any other cause) multiplied into the velocity of their common centre of gravity.

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T H E O R E M.

The strength of bones, whether solid or hollow, that is, the force whereby they resist being broken transversely, is as the area of their transverse section, multiplied into the distance of its centre of gravity, from the centre of revolution or fulcrum on which the bone is supposed to be broken.

D E M O N S T R A T I O N.

The absolute force whereby bones resist being broken transversely, is the power of cohesion uniformly diffused over the whole cohering surface: And this power of cohesion is compounded of all the powers exerted in every point of that surface: But these powers resist in parallel directions (being all perpendicular to the transverse section of the bone), with velocities proportional to their distance from their centres of revolution: And therefore, (by preceding *Cor.*) the strength of the bone, or total resistance of all these powers, shall be as their sum multiplied into the velocity of their common centre of gravity, that is, as the area of the transverse section of the bone, multiplied into the distance of its centre of gravity, from the fulcrum or centre of revolution. *Q. E. D.*

Cor. 1.

In comparing the strength of bones, if the areas of their transverse sections are to one another

other reciprocally as the distances of the centres of gravity of those sections, from their centres of revolution, the bones shall be of equal strength; and, contrarily, if the bones are of equal strength, the areas of their transverse sections, and the distances of their centres of gravity, from the centres of revolution, shall be reciprocally proportional.

Cor. 2.

In comparing the strength of bones: If the areas of their transverse sections are equal, their strength shall be as the distances of their centres of gravity from their centres of revolution; and if those distances are equal, their strength shall be as the areas of their transverse sections.

Cor. 3.

Since the centre of circles co-incides with their centre of gravity, the strength of bones, whether solid or hollow, whose transverse sections are circles or annuli, shall be as the areas of those sections and their radii jointly.

Cor. 4.

The diameters and peripheries of circles being as their radii, their strength shall also be as the areas of their transverse sections and peripheries, and as the same areas and diameters, jointly.

Cor.

Cor. 5.

Circles being to one another as the squares of their diameters, and consequently as the squares of their radii and peripheries; it follows, that, in solid bones, whose transverse sections are circles, their strength is as the cubes of their diameters, of their radii, and of their peripheries.

Cor. 6.

Similar figures being to one another as the squares of their homologous sides; the strength of bones, whether solid or hollow, whose transverse sections are similar, must be as the squares of the homologous sides of these sections, and the distances of their centres of gravity from the centres of revolution jointly.

Scholium.

In hollow bones, whose transverse sections are similar, their strength must also be as the squares of their thickness, taken at similar points of their transverse sections, and the distances of their centres of gravity from the centres of revolution jointly.

For the lines Cx , cx . Hx , hx , &c. (See *Tab. 1. Fig. 9, & 10.*) measuring their thickness at similar points, become homologous sides of the respective sections, which are here to be considered as figures returning into themselves at these lines Cx , cx . Hx . hx . &c.

Cor. 7.

The strength of bones, whether solid or hollow, whose transverse sections are similar, must also be as the squares of the perimeters of their transverse sections, and the distances of their centres of gravity from their centres of revolution jointly.

For (*See Tab. 1. Fig. 9, & 10. 11, & 12.*) if the areas of their transverse sections are called Z^2, z^2 . and the distances of their centres of gravity from their centres of revolution are called D, d $Z^2 : z^2 :: ABq : abq :: BCq : bcq :: CDq : cdq :: DEq : deq :: EAq : eaq$. Hence $Z : z :: AB : ab :: BC : bc :: CD : cd :: DE : EA :: EA : ea :: AB + BC + CD + DE + EA : ab + bc + cd + de + ea$; therefore $Z^2 : z^2 :: \frac{AB + BC + CD + DE + EAq}{ab + bc + cd + de + eaq} :: \frac{ab + bc + cd + de + eaq}{ab + bc + cd + de + eaq}$; but the strength of bones has been demonstrated to be as $Z^2 : z^2 +$ as $D : d$, and consequently their strength must also be as $\frac{AB + BC + CD + DE + EAq}{ab + bc + cd + de + eaq} : \frac{ab + bc + cd + de + eaq}{ab + bc + cd + de + eaq} +$ as $D : d$.

Scholium.

From the like way of reasoning it follows, that in hollow bones their strength shall also be as the squares of the perimeters of their cavity measured on their transverse sections.

For (*Fig. 9, 10.*) the lines HI & hi . IF & if . FG & fg . GH & gh . may be conceived as homologous sides of the respective sections, which must

AND OBSERVATIONS. 101

must here be considered as figures recurring on themselves in the lines *HZ*, *hz*.

Cor. 8.

In comparing the strength of bones whose transverse sections are similar, if right lines are drawn from the centres of gravity of these sections to similar points of their perimeters, (which we shall call similar radii of gravity) their strength shall be as the squares of these similar radii, and the distances of the centres of gravity of their transverse sections from their centres of revolution jointly.

For in the figures *OBCDEABO*, *obcdea bo* (See fig. 9 & 10, 11 & 12.) the lines *OB*, *ob*, &c. drawn from their centres of gravity *O*, *o*, to similar points *B*, *b*, &c. may be conceived as homologous sides of the respective figures, which, in this case, are to be considered as figures returning into themselves at the lines *OB*, *ob*, &c.

Cor. 9.

If the right lines *BO*, *bo*, (Fig. 9 & 10, 11 & 12.) are produced to similar points *K* & *k*, their strength shall also be as the squares of these lines thus produced, that is, as the squares of the diameters of gravity of the transverse sections, and the distances of the centres of gravity of the same sections from their centres of revolution jointly.

This is demonstrated as *Cor. 7.*

Cor.

Cor. 10.

The strength of bones, whose transverse sections are similar, being by *Cor. 8.* as the squares of the similar radii of gravity of these sections, and the distances of their centres of gravity from their centres of revolution jointly, it follows, that, when they are to be broken similarly, or, in other words, when the fulcrum or centre of revolution is placed in similar points of the bones, their strength shall be as the cubes of the similar radii of gravity of their transverse sections.

For, in this case, the distance of the centres of gravity from the centres of revolution coincides with similar radii of gravity.

Cor. 11.

The homologous sides, perimeters, and similar diameters of gravity of similar figures being as their similar radii of gravity, it follows, that, when bones of similar transverse sections are to be broken similarly, their strength shall also be as the cubes of the homologous sides, the cubes of the perimeters, and the cubes of the similar diameters of gravity, of their transverse sections.

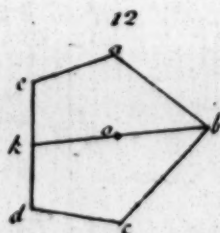
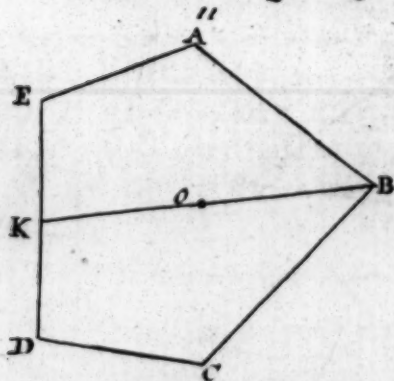
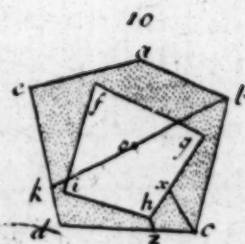
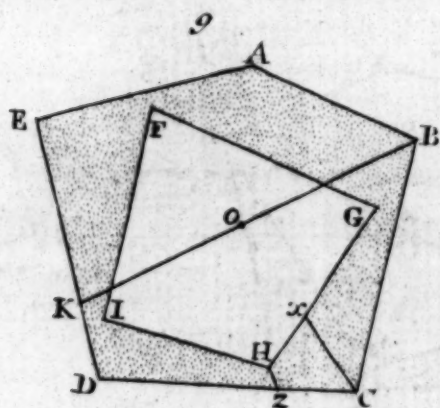
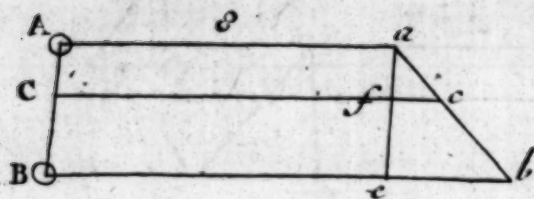
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XI. *REMARKS on the Articulation, Muscles, and Luxation of the Lower Jaw; by ALEXANDER MONRO, Professor of Anatomy in the University of Edinburgh, and F. R. S.*

IT is now near two centuries since anatomists have been universally acquainted with all the principal parts belonging to the lower jaw: They have known that the condyles are covered with a smooth cartilage; that the jaw moves on these processes which are received into a cavity of each temporal bone, immediately behind the root of the zygomatic process: And some have said, that the condyle of each side moves on the root of the zygoma. Nor have they been ignorant of the oblong moveable cartilage, which is concave in the middle on both sides, and is interposed between each condyle and the temporal bone with which it is articulated, nor of the ligament that connects the parts of this articulation. They have likewise described eight muscles that serve to raise the lower jaw, and all the other muscles which are so fixed to this bone as to be capable of pulling it down.

Though this account seems to comprehend all the parts that deserve to enter into a description; yet I imagine the mechanism of these parts is not hitherto sufficiently explained, authors having either overlooked some necessary circumstances of the structure, or observing too negligently the actions and motions performed here, and mistaking the proper organs of them; I therefore submit to your judgments to determine

mine whether the following remarks on the articulation and motion of the condyles, and on the actions of some of the muscles of the lower jaw, with a short observation or two on the luxation of that bone, and the manner of reducing it, deserve a place in your collection of Medical Essays and Observations.

Each condyle of the lower jaw is not articulated only with the cavity behind the zygoma; or only with the root of that process; but both the anterior part of the cavity, and the posterior part of the tubercle at the root of the zygoma, are covered with smooth cartilage for the jaw to move on, and the ligament of this joint is fixed into the circumference of these two surfaces. The share of the cavity covered with cartilage is small, but the ligament generally is spread over, and loosely connected by cellular membranes to a larger share of it backwards, and the large part, which still remains behind this, is filled externally with the parotid gland, which I have seen frequently resemble at this place the glands commonly called *conglobate* in its firmness and smoothness, but never could separate this part from the rest of the gland without violence. In the remaining share of the cavity, immediately before the styloid process, a fat cellular substance is lodged.

The exterior extremity of this oblong posterior cavity is made very narrow by the *meatus auditorius externus* being considerably advanced forwards here, which again prevents the condyle ever to be pushed so far back, as to be in hazard of doing any injury to the gland situated in the more internal part of the cavity.

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The ligament which rises from the circumference of the smooth surface of the temporal bone, is considerably long and wide, and is inserted into the edge of the concave moveable cartilage; from which edge another ligament goes out to surround the condyle of the jaw, and to be inserted into the neck of that bone: This last ligament is more tightly connected to the cartilage and bone than the former.

Each condyle of the jaw-bone stands with its greatest length transversely, but with a small degree of obliquity, the external extremity being a little farther advanced forwards than the other. It is also worth while to observe, that the convexity of this process is not perpendicular to the neck of the bone, but is almost turned entirely forwards, where it is covered with cartilage for the articulation, while the neck and posterior surface of the condyle, appear in one straight flat surface, with very little cartilage covering the upper part of it.

Into the anterior edge of the moveable cartilage interposed between each condyle and temporal bone, a considerable share of the external pterygoid muscle is strongly inserted, and some few fibres of the temporal and masseter muscles are also fixed to the external and superior part of this cartilage. Dr. Douglas * is the only author I know who has so much as hinted this insertion of these muscles.

For better understanding the preceding descriptions, I have herewith sent you a figure representing the parts described in their natural situation and magnitude. See *Tab. II.*

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* Myograph, chap. 20: & Append. p. 8.

When the teeth of both jaws are opposite, each to these of the same class, the condyles of the lower jaw are, in most men, placed in the cavity of each temporal bone; but, as soon as the teeth of the lower jaw are advanced forward beyond the range of the superior, the condyles descend on the tubercles. This any one can be sensible of in himself, by laying his fingers on the angles of his own jaw, while he performs these motions; and it is obvious to the sight when the articulation is laid bare by dissection, and the bone is moved in the manner mentioned.

The condyles can be moved laterally, when they are lodged in the cavities, or on the tubercles; but these lateral motions are much more confined in the cavities, because of the surrounding brims. These facts are to be examined in the same way as the former.

The lateral motions, and those backwards and forwards of the lower jaw, being exceedingly necessary for us in chewing, this mechanism of a double sort of articulation in a cavity, and on a protuberance, answers the design much more effectually than any one uniform surface could have done, whether we suppose it plain, convex, or concave; for, in any of these, the motion neither could have been so gradual, nor so steady, and, at the same time, so free and large. But, without the interposition of a doubly-concave cartilage, the motion of the condyle on the tubercle would have been vacillating and often dangerous, seeing the two convexities could only touch each other in one straight line; and therefore the condyle would have slid off, either

either back to the cavity again, or forward to occasion a luxation: Whereas the cartilage, when placed on the tubercle, renders the surface on which the condyle is to rest really concave, and exactly fitted to the convexity of that process. If, however, this cartilage was to remain always in the same situation in respect of the condyle, it would be unnecessary, if not inconvenient, when this process is lodged in the cavity; therefore the cartilage is never pressed farther back than the posterior surface of the tubercle, and there it receives the anterior convex surface of the condyle; but while the cartilage is on the lower part of the tubercle, only the superior straight part of the condyle is joined to it. This is evident on performing these motions, after the joint is laid bare, and part of the ligament which goes between the condyle and the moveable cartilage is cut.

The surface of both condyle and cartilage is so slippery, the anterior edge of the cartilage is so little prominent, and the anterior part of the ligament connecting the two is so loose, that the pressure of the condyle on the cartilage would not be sufficient to bring the cartilage as quickly forward as the condyle, which however I have endeavoured to prove is necessary; to prevent therefore the inconveniencies that might arise from the condyle's being immediately contiguous to the tubercle, some of the muscles, which serve to move the condyle forwards, are also inserted into the cartilage, and will equally advance both, and as the *external pterygoid* muscle has the most direct action this way, and indeed the largest share

in performing this motion, it has the greatest number of fibres inserted into the edge of the cartilage.

If the mouth was opened while the condyle stands on the tubercle, the flat back-part of the condyle would be applied to the cartilage, the anterior prominence of which would consequently have little effect in preventing the condyle to slip forward: So that, if the least force was employed at the same time to pull or push the jaw forward, a dislocation would inevitably happen. To prevent which the muscles that open the mouth are so situated, that, when they act, they must also pull the jaw backward: Hence when one attempts to open his mouth, while the under teeth are advanced beyond the upper, he immediately is sensible of the jaw's sliding back; and no dislocation does happen, without an external force applied, unless when the raisers of the jaw, by a convulsive contraction, as in yawning or violent vomiting, do forcibly keep the jaw forwards, in the time that the depressors are acting.

All the forces said to be employed to bring the lower jaw down in opening of the mouth, are the weight of the jaw itself, the action of the *platysma myoides*, and of the digastric muscles; but, as the two first are commonly allowed to be of little account, authors generally mention the digastric muscles to be the sole antagonists to the eight muscles that raise the jaw; which I have long suspected to have been assumed without sufficient examination, there being some obvious appearances that would seem to infer an incapacity in these digastric muscles, to

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open the mouth so wide, and with such force, as we really see it is; such as,

1. The fleshy bellies of the digastric muscles would appear too short for performing such a large contraction, as is often required, whether we allow, according to the common way of reckoning, each fleshy fibre to contract $\frac{1}{3}$ of its length, and still less, if with Bernouilli * we restrict such contraction to $\frac{1}{4}$ of the length of the fibre.

2. The proportional force of the digastrics, to that of the levators of the jaw, is considerably less than what is commonly observed in other parts of the body, where antagonist muscles are; which proportional force of these muscles is, on some occasions, greatly lessened by the angle of insertion of these digastric muscles into the jaw, decreasing as the mouth is opened.

These suspicions made me to enquire more exactly into the structure of the parts, and to try some experiments which seem all to contradict the common opinion: For,

3. There is no pulley the least akin to that of the larger oblique muscle of the eye, through which the tendon of each digastric muscle passes; but what is commonly called the ligament connecting the tendon of the digastrics to the *os hyoides*, is nothing else than part of the proper tendinous fibres of the digastric muscle, sent off from the rest in form of an aponeurosis †, which is fastened to the *os hyoides*, and is in part spread over the inferior extremity of the mylohyoides muscle, to be united

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* Act. Petropolit. Tom. 1.

† See Cooper's Myot. Tab. XXIII.

ted to such another aponeurosis of the other side; and the connexion of this aponeurosis, as it comes off from the round tendon, is so firm, that the least shuffling or motion of the round tendon within this ligamentous sheath, as it is commonly called, is not allowed: But, this aponeurosis being of some length, it can yield a little backward or forward when one or t'other of the fleshy bellies of the digastric muscle is shortened. Since then there is no sheath in which the middle tendon can slide, but that on the contrary it is connected to the *os hyoides*, we may see the unsuitness of the posterior heads of the two digastric muscles for pulling the jaw down.

4. That we may have ocular conviction of the posterior belly of the digastric having no effect on the lower jaw, let it be laid bare in a dead body, whose head must be reclined back for this purpose, and then pull this muscle in the direction of its fibres, while the *os hyoides* is kept firm, or a little brought down (which this bone evidently is, when the mouth is opened) the jaw will not in the least be moved. If the *os hyoides* is left unfixed while the muscle is pulled, that bone is brought upwards, till the two heads of the digastric are brought to form a straight line, after which indeed the force applied to the posterior belly of the muscle begins to depress the jaw. But, as the first case of the *os hyoides* being kept firm, is the only supposition to be allowed in the present question, I presume this conclusion from the foregoing observations will scarce be refused: That the common account of the action of the digastric

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stric muscles is not altogether so unexceptionable as it has hitherto passed for.

Having undone the mechanism of a pulley, through which the middle tendon of each digastric is said to pass; and having excluded the posterior head of that muscle from its office of pulling the jaw-bone down; I am almost induced to think, that, in the ordinary depressions of the lower jaw, the anterior bellies of the digastric muscles are as little employed as the posterior: For,

5. When the two extremities of this anterior head are pulled towards the middle by the help of a thread passed through the firm tendinous part near each extremity, the ends of which are crossed, and equally drawn in the direction of the fibres, which is the fairest way of knowing the action of any muscle, both whose extremities are moveable; when, I say, the anterior head of the digastric muscle is pulled in this manner, we observe the tendinous aponeurosis yield near as much forwards as one would expect the natural contraction of this fleshy belly would require. When the aponeurosis is fully stretched, the *os hyoides* is brought upwards, and then the jaw-bone is pulled down. If the *os hyoides* is kept firm, while this muscle is thus drawn, its effects on the lower jaw will be greater and more observable. And, if the posterior head is also pulled at the same time, the whole effort of the force where-with the anterior belly is drawn, is employed in opening the mouth. From which it would appear, that, in order to apply the power of this anterior muscular head to the jaw-bone, it is

necessary to suppose the posterior belly to act at the same time with it, that the aponeurosis may be kept stretched, which is all the service this posterior head does; and, in performing this, it must exert a force equal to the contraction of the anterior belly; and that force must be employed in the direction of its muscular fibres on the *os hyoides*, and therefore must counteract the muscles which pull the *os hyoides* down; but I shall afterwards prove that the action of these last muscles is constant and necessary in opening of the mouth; consequently the jaw gains nothing on this supposition of the anterior belly of the digastric assisting the depression of it, since an equal power is lost by the action of the posterior head. From all which there is at least a seeming improbability of any part of the digastric muscle acting in the depression of the jaw, when nothing is to be gained by it.

6. To confirm what has been argued for in the preceeding paragraph, let any one whose *tunica cellulosa* is not too well filled, apply his fingers to the teguments that cover the anterior heads of the digastric muscles, while the mouth is opened ever so wide, quickly, or strongly, he will indeed feel these muscles protruded a little outwards, by the swelling of those above them; but will not be sensible of their becoming either harder or shorter, which however is plainly to be felt at this same time in much thinner muscles, the sternohyoidei and sternothyroidei, by placing another finger on the forepart of the *trachea arteria*; and is manifest

AND OBSERVATIONS. 113

manifest in these same anterior heads of the digastrics, when deglutition is performed.

The office I would assign to the digastric muscles is to be principal instruments in the compound action of deglutition, one part of which they are exceedingly well adapted to perform, which is to pull the *os hyoides* upwards, and thereby to press the root of the tongue, &c. to the *velum pendulum palati*; for which purpose the only organs commonly mentioned, the *stylo-hyoidci*, *stylo-glossi*, and perhaps the *stylo-pharyngei* muscles are too weak, considering the resistance they must meet with, in raising so many parts, *viz.* the tongue, *os hyoides*, *larynx*, &c. whose muscles are to be stretched far beyond their natural tone. The fitness of these digastrics for such an office is pretty evident from a view of these muscles in their natural situation, and only applying the universally acknowledged effort of all muscles, to bring themselves in their contractions from a crooked to straight state. For further evidence, let both heads of either one or both digastric muscles be pulled in the manner formerly mentioned, and the raising of the *os hyoides* will be seen: Or, what may perhaps be as convincing, let any one swallow either solids or fluids, while his fingers are applied below his chin, and he will feel the swelling, hardness, and shortning of these muscles then in action.

Mr George Lauder, surgeon in this place, having dissected away a tumor covering one of the digastric muscles, caused the patient to drink while the muscle was laid bare; when he, and a
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numerous crowd of students in medicine, saw the muscle perform its contractions violently every time that the patient swallowed the liquor; unluckily he neglected to desire him to open his mouth wide and quickly.

This being granted to be the proper action of the two digastrics, we may readily assign several reasons why one can scarce swallow any with his mouth open: First, The lower jaw being then unstable and moving, these muscles have not such a fixed point to resist their actions. Next, The jaw and *os hyoides* being brought nearer, the curve made by the tendon of each digastric muscle must be diminished, consequently the effect the muscle would have on the *os hyoides* is also lessened; whereas it ought rather to have been increased, because the space between the *velum pendulum palati* and the *os hyoides* is increased, by this bone's being brought down at this time. Lastly, the muscles which serve to draw down the *os hyoides* being now in contraction, they must prevent the action of the digastrici.

We may here also observe how advantageously the tendinous aponeurosis of the digastric muscles are stretched over the mylohyoidei muscles, for raising the root of the tongue along with the *os hyoides*; and how the stylohyoidei and digastric muscles may act more uniformly and in more convenient direction, by the tendons of the latter passing through the substance of the former.

I come now to supply the function which I have endeavoured to deprive the digastric muscles of; but must previously remark, that the opening

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of the mouth does not only depend on the motion of the lower jaw downwards, but also on the superior jaw being raised up by the muscles which extend the head back: This fact is strongly denied by the generality of anatomists; and really passed unobserved by me, till my ingenious friend, and *quondam* pupil, Dr John Pringle, made me remark it; and any one may convince himself of the truth of it, by putting the blade of a knife, or his own nail, opposite to the conjoined edges of the teeth when the mouth is shut; which knife being held unmoved while the mouth is opened, he may, by the help of a mirror, see the upper teeth raised remarkably at every apperture he performs. The larger share however of the mouth's apperture is, in the ordinary erect position of the head, made by the lower jaw's being brought down by muscles that are commonly appropriated to the tongue, as *hyoides*, and larynx, which are capable, in my opinion, of being applied not only to this use, but to some others that are generally overlooked.

In considering these muscles in respect of the lower jaw, imagine the *sterno-hyoides* and *genio-hyoides*, or the *coraco-hyoides* and *mylo-hyoides* to act at the same time; it is evident, that the *sternum* and *scapula* being fixed in comparison of the jaw, these muscles may be looked on as digastrics, whose middle intersection is the *os hyoides*, and whose moveable insertion is the lower jaw. Imagine in the same manner the *sterno-thyroidei*, *thyro-hyoides*, *hyoglossi* and *genioglossi* to act all together, they

they may be considered as too many-bellied muscles acting on the lower jaw, which they will be sufficient depressors of in length, strength, and manner of insertion, without standing in need of assistance from any other muscles. Besides what might reasonably be deduced from viewing these muscles, and from pulling them in the direction of their fibres in a dead body, in proof of their being employed in depressing the jaw, we can be abundantly sensible of most of them acting when the mouth is opened, by laying our fingers on the teguments that cover them.

These muscles do, by the jaw's descending, lose somewhat of the advantageous insertion which they have when the mouth is shut; for the *os hyoides* will descend so much less than the jaw-bone, as the contraction of the muscles situated below the *os hyoides* is less than the joint contraction of these muscles, and of the others that go from that bone to the jaw: To mention an example, suppose the *sterno-hyoidei* and *genio-hyoidei* only to act, the chin will be brought proportionally so much farther down than the *os hyoides* descends, as the quantity of contraction of both *sterno-hyoidei* and *genio-hyoidei* is greater than the contraction of the *sterno-hyoidei* alone; in consequence then of the chin being brought nearer to the *os hyoides*, the muscles between these two bones come to have a more oblique direction to the jaw, or to have their angles of insertion diminished, and their force in pulling the jaw down lessened on that account: One advantage however is hereby obtained, that the root
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of the tongue, *larynx*, &c. are not removed too far out of their place; and that loss of advantageous insertion is compensated another way; for, when the muscles above and below the *os hyoides* are considered as digastrics, it is evident that this bone being placed farther back than the insertion of the muscles into the jaw, a considerable curve must be made at this bony intersection of these muscles; and therefore, by becoming straighter in their contraction, they must draw the *os hyoides* forward, by which this bone becomes more perpendicular to the jaw, and the muscles obtain necessarily a more favourable direction. But, in all positions of the *os hyoides* in respect of the jaw, the obliquity of the muscles backward is great enough to oblige the condyles of the lower jaw, when advanced on the tubercles, to slide back into the cavities in the time of their action, by which, as I hinted formerly, luxations are prevented.

This motion of the *os hyoides* forwards and downwards, which can be felt by laying a finger on this bone when the mouth is opened, leads us naturally to account for the use of the ligament which is sent out from the styloid process of each temporal bone to be fixed to each appendix of the *os hyoides*; for its direction is exactly such as prevents this bone to be drawn too far out of its place by the muscles that open the mouth; whereas it can be of little effect towards supporting the *os hyoides* and other parts connected to it, unless it had been more perpendicular. I imagine the resistance which these ligaments make to the muscles

muscles below the *os hyoides*, to be one reason why these muscles do not bring the *os hyoides* so far down proportionally to their lengths, as the others above it seem to depress the jaw, in opening the mouth. Which action I found to be performed by the several parts concerned in the following proportion; by straining I can open my mouth, when the head is in the most natural easy position, till the distance between my anterior *dentes incisores* is $1\frac{1}{2}$ inch, to which the extensor muscles of the head contributed somewhat less than half an inch by raising the upper jaw, the *os hyoides* descended about as much more than half an inch as the upper jaw wanted of it, and consequently the muscles between the lower jaw and *os hyoides* contracted one third of the whole space. I chose this straining posture, because any other degree of opening the mouth cannot well be determined; but I am at the same time sensible, that, where no such violent contraction of muscles is required, the proportional motions of these parts will be different from what I have just now described them; and, when the head is extended very far back, the lower jaw only is moved in opening the mouth, whereas this action is chiefly performed by raising the upper jaw when the head is bended much forward.

Supposing then the *mylo-hyoidei*, *genio-hyoidei*, *genio-glossi*, *hyo-glossi*, *sterno-hyoidei*, *coraco-hyoidei*, *thyro-hyoidei* and *sterno-thyroidei* muscles always to be employed in drawing down the jaw conjunctly, (whereof however in ordinary occasions some may be unactive) the

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force they are capable of exerting will be considerably less than that of the levators. From thence we may learn how the whole parts being left to their natural action, the lower jaw may be supported and the mouth kept shut by the superior power in the levators; whereas the depressors in their voluntary contraction (which is vastly greater in all muscles than the natural) may be capable of overcoming the natural force of the levators: Hence also we may see the reason of the jaw's falling down by its own weight, when the natural contraction of all the muscles is weakened by palsy, drunkenness, or sleep; or how, on the contrary, the mouth is violently kept shut, when the muscles are preternaturally contracted, as in convulsions, inflammations, &c.

These muscles which are so well adapted for depressing the lower jaw are capable of performing very different functions when the lower jaw is kept firm by the muscles which raise it. If they act at different times, the most remarkable of their actions will be these; the *genio-glossi*, *hyo-glossi*, *genio-hyoidei* and *mylo-hyoides* will pull the *os hyoides* and tongue upwards and forwards. If with these the *thyro-hyoidei* act, the larynx will also be brought along with the other parts; if with all yet mentioned the *sterno-hyoidei* and *coraco-hyoidei* act, the larynx only will be brought nearer to the *os hyoides*. If the *thyro hyoidei* alone act, the *os hyoides* and thyroid cartilage will approach each other proportionally to their mobility. If the *sterno-hyoidei* and *caraco-hyoidei* act with the former, the *os hyoides* will descend to the

cartilage. If to these the sterno-thyroidei are joined, then the tongue, *os hyoides*, and larynx, will be brought down. All the other combined actions of these parts are easily deducible from these mentioned. If these muscles act all together, and the jaw is kept firm at the same time by its levators, they have an effect not so generally remarked, which is the bending of the head forward, the articulations of the head and of the superior vertebræ being the nearest moveable joints; and, in this action, these muscles must have very great advantage by the great distance of their insertion from the centre of motion; or, in other words, by the length of the vectis they act with: As an evidence of the fact, let any one's head be pulled or pushed violently backward, his jaws are pressed strongly together, and his throat is tense with his larynx advanced, while he strains to resist the force applied: This the painters seem to have been abundantly more sensible of than the anatomists.

The sum of all I have argued for, concerning these muscles, may be deduced in these few propositions.

The digastric muscles serve to draw up the *os hyoides* and parts annexed to it in deglutition.

In opening the mouth, the head is extended, and the whole muscles of any considerable length and bigness situated betwixt the sternum and chin (except the digastrici) are put into action, the *os hyoides*, &c. are drawn down and advanced forward; if the jaw-bone was brought forward, it is made to slide back.

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When the mouth is kept shut, or the jaw-bone is made firm by its levators in any degree of the aperture of the mouth, that range of muscles just now mentioned may either contract successively, and then they act as commonly described, unless that, by being variously combined, they may be differently determined to pull up one part, or to depress another: Or, if all the muscles act together, they conspire to bend the head forward. See this subject treated at greater length, in Vol. III. Art. XIII.

WHEN the condyles of the lower jaw are luxated, the mouth stands open and cannot be shut; this Mr Petit † ascribes to the direction of the fibres of the muscles that raise this bone, being so altered in respect of the condyles, that these processes come to be situated in a straight line drawn from the origin to the insertion of the muscles; and therefore these muscles can have no other effect than to press the condyles closer to the temporal bones: It is evident however that this cannot obtain in most of these muscles; as, for instance, in the masseter and internal pterygoid, nay, the external pterygoid would seem to gain as much more in this morbid situation as the temporal lose; and I have seen people labouring under a luxation of the lower jaw, whose mouth stood open to a certain degree, but they could still open it farther, and bring it back again by the elevator muscles of the jaw. The plain cause of the mouth's not shutting in the luxation is the slipping of the coronoid processes

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† *Maladies des os l'v. 1. chap. 22.*

under the anterior root of the zygoma, and their being pressed on that bone; which is, I suppose, one reason why, after attempting the reduction of such a luxation, by simply pressing, or striking the fore-part of the jaw upwards; or, after applying any other force that presses the coronoid processes violently upon the bones of the upper jaw, a tension and inflammation may be brought on the parts hereabouts, and particularly on the temporal muscles, which afterwards may be followed by all the other symptoms of a pricked, bruised, or wounded tendon taken notice of by Hippocrates, because the tendon of the temporal muscle of the luxated side must suffer these very injuries, by being intercepted betwixt the corone and the *os maxillare* or *maxillarium*.

This cause of the mouth's remaining open in a luxation which I have assigned, was the common reason given for it before Mr Petit, and is strenuously defended by one of his critics †; therefore I need not have mentioned it, if Mr Petit's book was not in the hands of a great many young students here, and the other known to few; and I hope the other circumstances added, which are at least not so commonly remarked, will plead my excuse.

I have more than once found Mr Petit's method of reducing the luxated jaw-bone ineffectual, after the muscles had been swelled by unartful attempts of reduction, but have succeeded

† Dissertation au sujet des ouvrages de l'auteur du livres sur les maladies des os,

ceeded by a very small improvement on that excellent method, which was, to wrap linen so thick round my two thumbs, that I could scarce introduce them betwixt the posterior grinders; then taking hold of the base of the jaw with my fingers, and applying my palms under the chin, I pressed down and pulled forward the posterior part of the jaw with my fingers, and the points of my thumbs, which is the whole of Mr Petit's method; and, at the same time, I thrust the anterior part of the jaw upwards with my palms, so that the jaw being made use of as a lever to which the last joint of the thumbs served as a prop, I acquired a considerable additional force, to which the muscles were obliged to yield, and the condyles were disengaged entirely from the zygoma, and brought down, after which they slide backwards with the least assistance, and the reduction is fully made.

WHEN the thumbs employed, as just now described, have not force enough to make the reduction, my friend Dr Simpson, professor of medicine at St Andrew's, makes use of a round piece of wood eight or nine inches long, one end of which is cut into the form of a wedge, to introduce it between the teeth of the luxated side with the thinnest part as far back as the posterior grinders, when, having the head secured and raising the chin, he pushes the other end of the wood upwards to depress the back part of the jaw with the thin end, by which the force is much greater than the thumbs can exert.

THE origin and course of the CHORDA TYMPANI being described by few authors, and scarce delineated by any in the natural position, and the figure easily admitting of the representation of the inferior maxillary branch of the fifth pair of nerves, as it comes out of the skull, and divides into its branches, I have caused that nerve, and the *chorda tympani* to be painted, which I shall say, with the generality of anatomists, proceeds, or is sent off from that nerve, though I rather incline to think it a branch of the *portio dura* of the seventh pair united to the fifth. The *chorda tympani* takes its origin most frequently from that branch of the fifth pair that is bestowed on the tongue; but I have seen it sometimes rise from the trunk which furnishes the branch given to the tongue, and the other that enters the posterior hole of the lower jaw. The *chorda* immediately after its rise runs backwards and outwards, involved in a cellular substance, till it sinks within the bony part of the *tuba Eustachiana*: The situation of the skull in drawing this figure would not allow me to delineate more of this chord, without destroying some parts that were chiefly designed to be illustrated here; wherefore I shall refer to *tab. xiii. and vii. of Du Verney's traité de l'organe de l'ouïe* for what remains of it; and seeing our common systems, nay the authors who have expressly treated of the nerves, pass the description of this nerve generally very slightly, I shall translate Mr Du Verney's description, which is the fullest and most exact I know.

“The

“ The little nerve (says he, page 51.) that
 “ crosses the tympanum, has its origin imme-
 “ diately from the branch of the fifth pair of
 “ nerves, which descends to be distributed to
 “ the side of the tongue; this little nerve a-
 “ scends to the exterior side of the bony part
 “ of the *tuba Eustachiana*, and following the
 “ course of the external (commonly called now
 “ the oblique) muscle of the malleus over which
 “ it lies, it enters by the same aperture into
 “ the tympanum; then it passes under the ten-
 “ don of the internal muscle, and, descending
 “ obliquely from before backwards, it lies up-
 “ on the membrane of the tympanum, and pas-
 “ sing before the long leg of the incus, it at
 “ last escapes out of the cavity of the tympa-
 “ num, to enter into a small canal formed in
 “ the *os petrosum*, and is joined to the *portio*
 “ *dura* of the auditory nerve, a little before
 “ the *portio dura* makes its exit from its ca-
 “ nal.”

The only remark I have to make on this de-
 scription is, That I am at a loss how to under-
 stand the words, *It lies upon the membrana*
tympani *; for it does not appear to be imme-
 diately contiguous to that membrane.

I have also caused the *tubæ Eustachianæ* to
 be represented in this figure, in full view, that
 one, by supplying in his imagination the *velum*
pendulum palati and *uvula* depending oblique-
 ly from the edge of the palate bones, or by
 consulting Du Verney's *tab. IX. fig. 2.* may ea-
 sily understand the true situation of the orifices
 of the *tubæ*, which some anatomists seem not

to

* Il se couche sur la peau de tambour.

to be entirely well acquainted with, though it is an anatomical fact necessary to be exactly understood, especially if it shall be found, that the method of injecting medicines by this canal for curing deafness in several cases shall prove successful, which there is a great probability it should; and of which Mr Guyot gives a good instance, by relating his own cure*. The instrument he made use of for injecting the medicines is described at great length, by Mr Garangeot, in his treatise of *chirurgical instruments*.

By authors neglecting to explain the method they took to represent the parts delineated in their figures, disengaged from all the others to which they are naturally contiguous and adherent in the body, I have often observed younger anatomists utterly at a loss to search out the parts which they imagined they understood exactly the situation and structure of, from the representation authors had made of them. To prevent such an inconvenience in the present case, allow me to inform your readers how the bones appear so bare, and yet the softer parts which were designed to be represented are preserved entire.

Mr Cooper, who both drew and engraved the following figure, not having been formerly in use to work on anatomical subjects, I put a skull perfectly cleaned in the proper attitude, and let him draw it at his leisure; then I caused him to supply the other parts painted from the first recent subject I had afterwards, whose skull was very near of the same dimensions, having

* Hist. de l'acad. des sciences. 1724.

having previously made the bones as bare as I could without boiling or macerating, and without injuring the soft parts designed to be illustrated; which method has had a good effect, by making the whole figure more simple and beautiful.

Explication of Table II.

- A. The occipital bone.
- B. The lambdoid future.
- C. The great hole of the occipital bone through which the *medulla spinalis* passes.
- D. D. The condyles of the *os occipitis*.
- E. E. The mastoid processes of the temporal bones.
- F. F. The styloid processes.
- G. G. The zygomatic processes.
- H. H. The holes through which the lateral sinuses and eight pair of nerves pass.
- I. I. The passages of the carotid arteries.
- K. K. The external wings of the pterygoid processes of the sphenoid bone.
- L. L. The internal alæ.
- M. M. The external ears.
- N. The left temporal process of the sphenoid bone.
- O. The back part of the vomer.
- P. P. The part of the parotid glands lodged in the back-part of the cavities which receive the condyles of the lower jaw.
- Q. Q. The *tubæ Eustachianæ*.
- a. The Tubercle of the left temporal bone

- bone on which the condyle of the lower jaw moves when the maxilla is drawn forwards.
- b. The cavity behind that tubercle wherein the condyle is commonly lodged. The surrounding ligaments hinder this cavity to be fully represented.
 - c. The ligament which connects the moveable cartilage to the temporal bone.
 - d. The moveable cartilage of the right side brought forwards on the tubercle that it might be fully seen.
 - e. The circular ligament which connects the cartilage to the condyle of the jaw.
 - f. That part of the external pterygoid muscle which is inserted into the moveable cartilage, and serves to pull it forwards.
 - g. g. The third branch of the fifth pair of nerves coming out of the skull.
 - h. h. The branches of that nerve given to the temporal and masseter muscles.
 - i. i. The *chorda tympani* sent off from the branch of that nerve which is distributed to the tongue.

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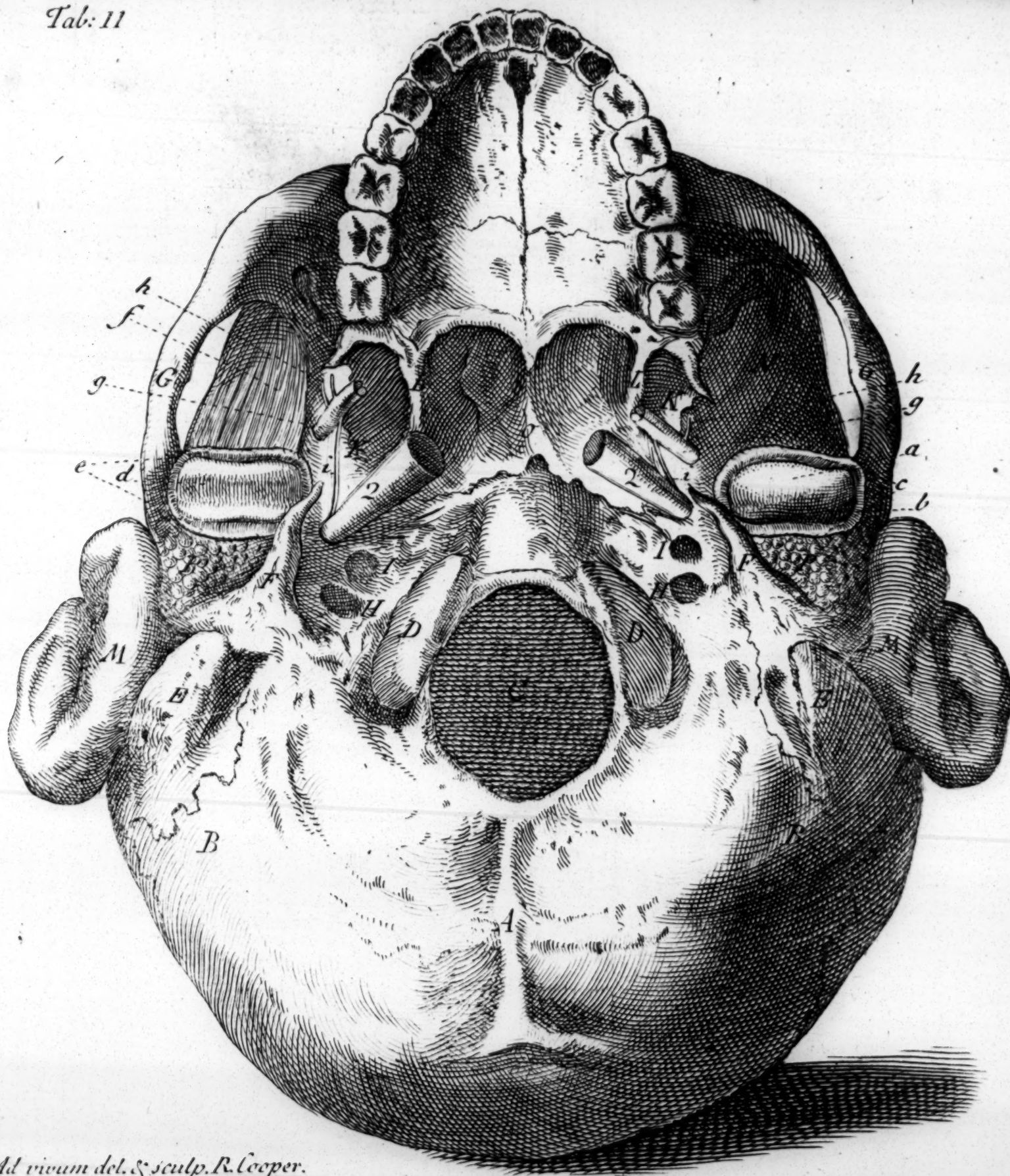
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XII. *An Essay on the alternate Motions of the Thorax and Lungs in Respiration; by Dr GEORGE MARTINE, Physician at St Andrew's.*

NO compleat theory of respiration has been yet sufficiently explained and fully established: After all the ingenious contemplations and experiments of philosophers anent the properties of the air; after all the most curious researches of anatomists, and the careful observations of physicians about the fabric, uses, and diseases of the parts concerned, there are still left many difficulties, which I am far from pretending to remove; much has been wrote, many have been the disputes about the primary use of respiration, about the passages of the blood through the lungs, about the influence of the inspired air upon the blood, &c. But, all these being laid aside at present, I shall only consider the mechanism whereby, in ordinary life, expiration and inspiration succeed one another alternately.

2. You will not be satisfied with Swammerdam's † telling you in general, That these muscles, which are not exactly balanced by equally strong antagonists, must necessarily be contracted and relaxed by turns; as, in the motions of the ventricles and auricles of the heart, of the respiratory muscles, of the antagonists of wounded or paralytic muscles, &c.

He

† De resp. p. 67. & Pos. Inaug. § 8. 9.

He does not offer at explaining the mechanism of the alternate contraction and relaxation of the muscles in such motions, which is the point in question ; nor is it probable that all these very different motions are to be explained by any one uniform principle.

3. Nor will you think Borelli † has given a perfect solution of the problem, by saying, That, after once respiration is begun, the animal, from the good it feels by it, is necessarily determined to continue the same all its life afterwards.

We allow the necessity of respiration ; we know it serves for many noble purposes : But still we are at a loss to understand by what natural mechanism, expiration and inspiration necessarily continue to succeed one another by turns.

4. We cannot omit to remark, that the great Bellini thought himself master of this difficult question, as of almost every thing else relating to the nature and fabric of animals. In the beginning of his *opus medicum de urinis*, &c. he lays down several very pretty physiological propositions ; among which is this ‡, “ *Contractis semel musculis pectoris, per totum vitae spatium respiret animal necesse est, iidem scilicet muscoli per universum illud tempus alterne restituantur et contrahantur.*” This he gives us without any illustration or proof ; and I fear we shall never hear more of that great man's thoughts on this subject. Nor does his friend,

† De mot. anim. 11. 117.

‡ De resp. § 18.

friend, our worthy countryman Dr Pitcairn, (who wrote his dissertation *de Causis diversis Morbis quæ sunt Sanguinis per Pulmones, &c.* chiefly to illustrate Bellini) supply this want, or at all answer our wishes or expectation. He tells * us, after Swammerdam, That muscles without antagonists, such as he conceives the inspiratory muscles to be, must necessarily be contracted and relaxed alternately; and that, by the alternate influx of the animal spirits through the nerves into them, proceeding from the alternate compression of the brain, by the pulsation of its arteries.

By laying aside those reasons which induce some † to think the natural motion of the liquor of the nerves to be very uniform; if Dr Pitcairn's solution of the alternate dilatation and contraction of the thorax were true, I cannot see but that they should always correspond, and be isochronous to the pulses of the heart and arteries; which every body knows to be false in fact. Yea, though we should allow them in many cases to correspond in some measure, yet Dr Harvey ‡ has well observed, that the pulse and respiration do sometimes suffer changes of frequency, directly contrary to one another.

5. This consideration does likewise, I humbly think, very much invalidate the way wherein the judicious and accurate Boerhaave chuseth to explain the alternate motions of respiration.

VOL. I. M He

* De caus. div. mor. &c. § 16. El. med. r. §. § 70.

† Boerh. inst. med. § 288.

‡ De mot. cord. procem. p. 15.

He supposes *, that, at the end of inspiration, the lungs being stuffed with air, and every way compressed, the free passage of the blood towards the left ventricle of the heart is somewhat obstructed; and consequently a smaller quantity is carried to the inspiratory muscles of the chest, and a weaker circulation towards the cerebellum and its nerves, which are supposed to actuate these muscles: So that, the inspiratory organs being weakened, expiration must of necessity succeed by the natural restitution of the compages of the thorax and abdomen; whence the blood, passing again more freely through the lungs to the left ventricle, will be the more plentifully bestowed upon the cerebellum, and these inspiratory muscles, which then must of their own accord immediately dilate the cavity of the breast, or produce inspiration, which expiration does necessarily succeed, and so on.

But, besides the dissonance of the motion of the heart and thorax just now mentioned, I believe it will be difficult to persuade us that the diaphragm and intercostal muscles cease to contract for want of a sufficient store of blood furnished to the left ventricle of the heart, or for want of spirits furnished to the cerebellum and the vital nerves. Would not, upon the same account, all the other muscles, whether voluntary or involuntary, and the brain itself, and all the nerves of sense and motion, alternately suffer some failure (*εκλειψή*) at the end of every inspiration, from the diminished quantity of blood supplied to the left ventricle, and thence

* Instit. Med, § 619. 620.

thence to the rest of the body? Is not the beating of the heart and arteries equally full, equally strong, and equally frequent at all the different moments of respiration? which plainly shews, that, in a sound state, the heart never wants blood, nor the cerebellum spirits to furnish the organs that depend upon them: So that the inspiratory muscles, which are supposed to be vastly stronger than their antagonists, would always remain rigid and contracted, if there were not some other way provided to suspend alternately the cause of their contraction.

6. Seeing then these so very great men had made their attempts with so little success, I gave over thoughts of so much as an approach to any true and just account of a phænomenon so obvious, but so difficult to be explained; until at length, meditating upon the rise and singular course of the nerves of the diaphragm, I thought I could perceive a necessity of their being alternately compressed, and again set at liberty, so as to produce an alternate contraction and relaxation of that muscle.

Every body allows, that it is the chief organ of ordinary and natural respiration, since, from the swelling of the belly, we find the enlargement of the cavity of the breast is more owing to the depression of the midriff, than to any remarkable change in the posture of the sternum and ribs. Now let us trace as far as we can, and admire the adorable wisdom and contrivance of our great Creator. He has not provided the midriff with nerves from the trunks nearest it, either from the *par vagum*, or that which is called *intercostal*, or the spinals of

the thorax or loins next to it: No, he has brought nerves to it from afar, and conveyed them a long course, through the cavity of the breast: For the phrenics, though they should not be allowed in all subjects to be made up precisely of the same twigs, yet anatomists have always found their chief origin from the middle cervical nerves. And I think we need not mind Vicussens's * small filaments from the intercostal or first lumbar; or Columbus's † from the last thoracic given to the diaphragm. Much less are we to regard any branches of the eighth pair said to be distributed to it by some of the ancients; since Galen ‡ assures us it has not the least twig from thence. Why then has nature been so solicitous in giving the principal diaphragmatic nerves such a far-fetched origin, and carrying them such a long course? If you shall once perceive her design in this, I am hopeful you shall with pleasure comprehend the alternate motion of respiration, as far at least as it depends upon the motion of the diaphragm.

7. First then, we are to conceive the external air gravitating equally *undequaque* by its weight and fluidity; and therefore pressing upon the hollow surfaces of all the pulmonary vesicles, and consequently upon the membrane investing the lungs, and inclosing all these vesicles: By the mediation of this coat of the lungs, that pressure of the air should be propagated to the membrane lining the thorax, which we commonly

* Nervog. T. xxiii. § 8. T. xxviii. 1.

† De re anat. viii. 6.

‡ Diff. nerv. 10.

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monly call the *pleura*. But now, at the end of expiration, the thorax being collapsed, consider the natural contractility of all the membranes and fibres of animals, but especially consider the reticulated work of muscular fibres surrounding the lungs, and every way pervading and strengthening their substance *: Consider these circumstances, I say, and you will straightway conceive how the contractile pulmonary membranes and fibres will, by their reaction, in some measure support the action or pressure of the inflating air; which therefore cannot press with its whole force upon the pleura; but the phrenic nerves run along the pericardium, covered very slightly by the pleura or mediastinum: So that in this supposed moment of time, at the end of expiration, the pressure of the air upon these nerves must be less than upon the other parts of the body, to which the compressing force of the surrounding atmosphere has a freer and less interrupted access. Whence the liquor of the nerves, or whatever influence is communicated by them, must find a more free and easy passage to the midriff; whereby that muscle begins immediately to contract itself; and by the enlargement of the thorax, inspiration commenceth. During the course of which, these nerves continue rather freer from compression, by the inflation of the lungs stretching more and more the contractile pulmonary fibres, which therefore do more and more support the pressure of the atmosphere.

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8. So

* Malpighii in Phil. Transf. 71, Abr, 12. p. 818. & Vita posth. p. 9,

8. So then, after expiration, we find inspiration must necessarily succeed; which will continue until the thorax shall have acquired its ordinary enlargement, by the natural and ordinary depression of the diaphragm. Then indeed the inspired air, being rarified by the heat of the breast, and not finding a free enough exit by the narrow slit of the glottis, will press every way the containing vesicles and membranes of the lungs. Which pressure therefore will be forcibly propagated to the containing pleura, and to the phrenic nerves. Hence then their influence must cease, and the diaphragm be relaxed; and so, from a mechanical necessity, expiration must succeed by the spontaneous restitution of the overstretched peritonæum, and abdominal muscles: For these, compressing their contained viscera, must push the midriff into the thorax, and so compress and squeeze the lungs much more forcibly than if they were left alone, to their own natural contractility. Thus then the pressure of the lungs upon the circumambient pleura and phrenic nerves, must subsist all the time of expiration, until at its end every thing come to that state of æquilibrium we first proposed; wherein the contractility of the lungs bearing off some small part of the pressure of the atmosphere from the pleura, the spirits find a free passage through the phrenic nerves, the diaphragm is contracted, and the air inspired; which very soon comes to be expelled in the manner just now expressed. May it not then be allowed that we have explained the mechanical necessity

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cessity of the alternate dilatation and compression of the lungs, as far as they depend on the motion of the midriff? Since that muscle being alternately contracted and relaxed, inspiration and expiration must always successively follow one another.

9. But since, beside the action of the midriff, the figure and capacity of the thorax suffers a considerable change in respiration, by the contraction chiefly of the intercostal muscles, and that especially in women; the next step should be to consider the condition of the nerves belonging to these muscles; whereby, from an alternate compression, or some such mechanism, the muscles may suffer an alternate contraction and relaxation.

In the common account of both internal and external intercostals conspiring to dilate the thorax, and to produce inspiration, it were very easy to say that the difference of the pressure of the lungs upon the back part of the pleura, and consequently upon the spinal nerves running behind it that furnish spirits to the intercostal muscles, is sufficient to our purpose, in the manner we have explained the action of the phrenics. But, besides the doubts I have a long time entertained about the action and the use of the internal intercostals, I am afraid you will tell me, that the thoracic spinal nerves, even before they be received between the double row of intercostal muscles, are so well defended by the tense and firm pleura covering them at the side of the spine, that the variety of the pressure of the lungs must have much less influence on them, than upon

upon the phrenics; for they, in their course along the pericardium, are but very slenderly guarded; and must therefore too be much more liable to such differences of compression, than the other nerves passing through the thorax and influencing the heart and other viscera equally in both states of respiration.

And this puts me in mind of something, which, tho' not directly belonging to our present subject, is worth observing in few words; and that is, That † the intercostal and eighth pair of nerves not only pass through the thorax, but pierce the fleshy part of the midriff. Whence you will be ready to conclude, (as was hinted by Morgagni) ‡, That their influence on the abdominal viscera should not be constantly uniform, but frequently pushed on, and interrupted by turns. And indeed this is very much countenanced by the wave like peristaltic motions of the stomach and guts, which would seem to argue the action of their nerves to be promoted and obstructed alternately.

But, though the alternate action of the intercostal muscles may not be so satisfactorily explained in the manner above mentioned, I do not despair of our coming to a better understanding of it, if we were perfectly acquainted with every minute circumstance relating to the structure of these muscles, and of the blood-vessels and nerves belonging to them; which therefore I would earnestly recommend to those curi-

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† *Vienf. Neurog.* iii. 4. p. 183. 186, iii. 5. p. 194. 198.

‡ *Advers. Anat.* V. 12, p. 17.

ous and subtle dissectors, who have both skill and opportunity to penetrate into the inmost recesses of the human body, that some time or other we may become fully masters of so elegant a problem.

COROLLARY.

Of the Beginning of Respiration in born Animals.

The illustrious Harvey proposed this problem †, “Cur foetus in utero, non respirans aerem, usque ad mensem decimum, ob defectum respirationis non suffocatur? cum natus in septimo vel octavo, quamprimum aerem inspirat, inhibita postmodum respiratione, ob defectum aeris suffocatur? &c.” Many solutions have been offered by physiological writers, drawn from their different hypotheses of respiration, the justness whereof it is not our business at all to examine: It is more to the purpose to propose and endeavour at a solution of another problem something a-kin to it; which either has not been well minded, or not well understood hitherto, viz. “Why a foetus, in the time of gestation, never dilates its thorax, nor at any time before the birth performs, however slowly, the motions of inspiration and expiration successively?” Since, in the common hypothesis, the inspiratory muscles having no antagonists, or but weak ones, there is nothing to hinder the dilatation of the thorax, and the reception of the liquor of the amnios into the lungs; which therefore should be alternately

† Exerc. II. ad Riolan. p. 101. &c. de gen. anim. p. 263.

nately received and expelled, as the air is in born animals, if there were forces sufficient to carry on these motions.

This matter is easily cleared up from the preceding doctrine of alternate respiration; let us suppose, according to the old opinion, (which some particular considerations seem much to favour), that the two orders of intercostal muscles antagonize one another; and we may easily allow, that in gestation, while the foetus continues enveloped in the secundines, and immersed in the *colliquamentum amnii*, the phrenic nerves are too much compressed to allow a free passage of the spirits to the diaphragm. But, as soon as the animal comes to light, and enjoys the external air from any the least motion of the breast, (and in every birth many such motions there are), the phrenic nerves which were formerly compressed by the lungs, &c. come now to have a part of that pressure taken off, in the manner we have formerly explained: So that they, being now at more freedom, will contract the midriff; which, being once set a going, will for ever suffer an alternate contraction and relaxation, while the animal continues in life and health.

XIII. *An ESSAY on the Nutrition of the Fœtus in Utero; by Mr JOSEPH GIBSON Surgeon at Leith, Member of the Society of Chirurgion-apothecaries of Edinburgh, and City Professor of Midwifery.*

AS the most plausible account of generation, or the principles upon which it is established,

established, are equally obscure and controverted; so the way whereby the foetus is maintained, both has and still continues to be matter of dispute among the learned. Thus the memoirs of medicine make it abundantly evident, that the question relative to the nutrition of the foetus *in utero* was very early agitated, as well by philosophers as physicians; and, as they did not agree in their sentiments, so the controversy, even till this day, stands undecided amongst the moderns; and, though I am well enough aware, that many more difficulties lie in the way than I am able to remove; yet, in order to clear this intricate subject, as much as I can, from these obscurities with which it is so much clouded, I shall adventure,

1st, To range and state the different opinions of authors, together with the grounds and arguments that support them; and by the way shall hint also at those which do oppose them.

2^{dly}, I shall explain that opinion which appears to me to be most consistent with truth, and endeavour to confirm it by evident facts, rational consequences, and natural analogy.

Agreeable then to this method, the first opinion relative to the nutrition of the foetus *in utero*, that offers itself to our consideration, is the following:

That the foetus receives all its nourishment by the mouth.

This notion was very early invented by Democritus * and Epicurus, as Plutarch testifies in

* Though Plutarch names Democritus, without any appellative, or distinguishing epithet, yet it is not once to be doubted

in his book *De placitis Philosophorum*, lib. 5. cap. 16. For maintaining whereof, the same author tells us, That these old philosophers assigned the following reasons: That in the uterus there are little duggs, to which the embryo applies its mouth, and from thence sucks its aliment; and that therefore, so soon as it is born, it draws its nourishment in the same manner from the breast.

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doubted that it is Democritus Abderitanus, to whom he ascribes this tenet, and not to Democritus of Co. Nevertheless I cannot avoid to observe, (though foreign to my present purpose), that more than justice is done to the first by the generality of authors † when they assign to him the honour of having been master to the divine Hippocrates; for, if we reflect upon the variety of arguments used by the people of Abdera to persuade Hippocrates to come to, and undertake the cure of Democritus their fellow-citizen, that of his having once been his master, could never have escaped them; nor would Hippocrates have engaged in that voyage, and in the care of Democritus, rather "from a commendable enough reverence to the gods and nature," as he expresses it ‡, than at the moving intreaties of the people of Abdera, or from a grateful sense of Democritus having been once his master; which consideration alone would have been a sufficient motive to have made him comply with their desire, if we remember the obligations he laid upon his disciples by oath ||, "to honour a person who taught them the art of medicine, as their natural parent, to let him participate of all that lay in their power in relation to the necessities of life, &c." Wherefore, when Hippocrates is said to have been the disciple of Democritus, my judgment, it ought to be understood of Democritus of Abdera as Dr Douglas § himis, though I think the authority quoted for proving this, is by no means to be found in that place. Celsus, which is pointed at by this learned gentleman.

† Soranus, Suidas, Celsus, &c.

‡ Epist. S. P. Q. Abderitarum.

|| Hippocrat. iuramentum.

§ Bibliograph. anatom. specim. p. 7.

The first of which being imaginary, does not merit our attention; nor is there more in the second, as will appear from what may afterwards be advanced. Hippocrates indeed, and after him many of the moderns, have added much stronger reasons to prove that the foetus receives nourishment at the mouth; but seeing the divine old man has likewise maintained that it is also supplied by the umbilicus, what he has delivered in support of the first opinion will come more naturally under our thoughts, when we treat of the fourth; and therefore I shall in this place only take notice of those new arguments which I find advanced by any of the moderns to strengthen this old doctrine, and which will not so readily occur afterwards: These are reducible either to a denial of any communication of the blood-vessels of the mother and infant, or to an absolute unsuitness of the mother's blood for that purpose.

Claudius de la Courvée, Charletoun, Antonius Everhardus, Franciscus Bayle, Vander Wiel the father and son, have strenuously maintained the first of these by many arguments, which being mostly hypothetical, can by no means be particularly answered in this confined place; therefore let it suffice to say in general, That the denial of any communication betwixt the blood-vessels of the mother and infant, (which wholly depends on this, that there follows no blood upon the division or separation of the umbilic vessels from the cotyledons of brutes), is an inference too hastily and inconsequentially drawn from a true observation; for, not to mention a multitude of things, besides the

number in which the brute cotyledons do differ from the human placenta, the very phenomenon which happens upon the separation of the extremities of the blood-vessels that belong to the brute foetus, from the alveoli or sockets in which they are lodged, as it is very remarkable, so it easily solves the difficulty; for these alveoli, upon the extraction of the umbilic vessels from them, are by their proper elasticity instantly curled up, or as a purse-mouth drawn together; whereby the effusion of the least drop of blood from them must necessarily be prevented: Whereas the uterine arteries of the human females, having the umbilic veins of their proper foetus immediately implanted into them, without any intervening medium, (as in the comparative instance just mentioned), do constantly pour out blood, upon the separation of the placenta from the uterus in abortions and at deliveries, which is always in a greater or lesser quantity, and sooner or later loses the colour and consistency of blood, as the uterine vessels are more or less elastic, or as there are wanting or present impediments to the contraction of the womb.

Mr Jussieu (so far as I remember) stands alone, in maintaining the nutrition of the foetus by the mouth, from the consideration of the absolute unfitness of the maternal blood for its support, imagining and asserting that there exist in it many fiery, and but few alimentary particles; and that its motion being too rapid, would rather beat into disorder the weak and tender parts of the embryo, than gradually extend and increase it. The first two of these arguments

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guments being trifling and precarious, scarcely deserve to be recited, far less to have any particular answer: Nor does there appear to be much in the third; however I shall have occasion, in the sequel of this essay, to obviate its force.

The second way then which we find condescended upon by the writers of physiology or anatomy, whereby they supposed the foetus *in utero* to have been nourished, was by the umbilic vessels, and by these only.

The Stoic philosophers † were the first who taught and maintained this doctrine, and, so far as I can observe, enjoyed it alone for a very considerable time; though it is indeed obvious that Hippocrates, Aristotle, and Galen did also early affirm that the foetus received part of its nourishment this way; yet, since it is likewise evident that they did not restrict its conveyance to the umbilic vessels only, they are by no means to be esteemed abettors of this dogma; and therefore Andreas Laurentius ‡ to whom, soon afterwards, Fabricius *ab Aquapendente* § assented, is the first among the medical tribe who may be reckoned to have adopted this opinion: But indeed many amongst the moderns have since listed themselves as champions ready to defend this cause. I might here select my learned and ingenious friend §, for whom I have the greatest regard, and who so justly bears a considerable character in that society of

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which

† Plutarch, de Placit. Philos. lib. 5. Cap. 16.

‡ Lib. 8. Cap. 6.

§ Lib. de format. foet. cap. 8.

§ Mr Moore, Professor of Anatomy.

which I have likewise the honour to be a member; but seeing he has hitherto only given it countenance, by affording some remarks and observations tending to establish it, which he communicates to us by the works of another †, I chuse rather to consider the arguments advanced for its support by Dr Bellinger ‡, who has treated this subject *ex professo*.

This learned gentleman taking the communication between the mother and infant by means of the umbilic vessels as granted or self-evident, goes on to establish the above doctrine by negative arguments, wherewith he pretends as well to exclude the mouth from having any part or share of action in the nutrition of the foetus, as to demonstrate that the *liquor amnii* is an unfit *pabulum nutritionis*, and thence infer that the foetus must receive all its nourishment by the umbilic vessels; but how well he succeeds in this, I shall presently enquire, by considering his arguments as they lie in order, of which this is the first and principal one:

“That since monsters have been brought forth perfectly formed, their want of mouths, or, in some, of heads, excepted, the foetus cannot therefore in a natural way be imagined to have its nourishment communicated to it by the mouth.”

It might perhaps be esteemed a sufficient reply to this argument to retort upon him his own answer to Mr Bayle upon another occasion:

“That we are not altogether to rely upon some experiments and accidental occurrences

— † Mr Cheselden's system of anatomy.

‡ De foet, nutrit.

"rences in accounting for all the proceedings
 "in the animal machine." But to be more
 particular, this argument depends upon a very
 uncertain and precarious supposition, namely,
 that the want of any part in an otherwise
 well-grown monstrous foetus proves it to be
 useless in a natural state; for at this rate (a-
 mong many other instances,) it might be as
 justly denied that the *par vagum* in a natural
 foetus does contribute to the motion of the
 heart, because one of the monsters he conde-
 scends upon, *viz.* that taken from Paré, wanted
 the head: But as in such instances where a
 part of the body is naturally supplied by two
 vessels, and has by any accident one of them
 obstructed, we do nevertheless frequently see
 the part to be well enough provided for by the
 other; so, in the case before us, the heart,
 which has naturally nerves both from the *par*
vagum, and *intercostal*, is sufficiently supplied
 by the latter, though the great Lower † has unde-
 niably proved that it is the former which is the
 principal instrument of the motion of the heart
 in man, and those animals whose bodies stand
 erect; wherefore it would in my judgement be
 very rash to conclude, though Paré's monster
 wanted the head, that therefore the *par vagum*
 in a natural state is of no use: For my own part,
 in such singular instances, I think it more reason-
 able to be satisfied with attributing a greater
 than ordinary share of action to that part
 which supplies the want of the other, than to
 deny the natural and ordinary function of that

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† De mot. cord.

other part, in opposition to the most evident signs of its operation ; this being to determine what is natural by what happens once, rather than by what happens usually or almost always.

Next I would observe, that, where monsters have been brought forth wanting heads, or at least having their mouths shut, it is observable that this defect, when such productions have been accurately examined, is often, if not always, found to be supplied by some other contrivance.

To prove this position, I shall condescend upon two examples, the one taken from a human, and the other from a brute foetus ; the first of these being recited by Dr Gibson in his anatomy of human bodies † at some length, I must refer to the passage, and only transcribe his scholium upon the dissection : “ This (says he) is a plain confirmation of the foetus being nourished by the mouth ; for the gullet being impervious (which is equal to its wanting the head, or having its mouth shut) nature had formed a hole in the wind-pipe and below in the gullet, for the liquor contained in the amnios to pass into the stomach, which it might easily do without prejudice, or any fear of choaking the child in the womb while it breathed not ; but, when it was born and came to breathe, there could be no longer any passage this way, and so the infant was necessarily famished.” And agreeable to this, Vander Wiel, ‡ the father

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† Lib. i. cap. 33.

Vol. 2. observat. 32.

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assures us, that at the Hague he himself saw a monstrous lamb, who, having no mouth, had its nourishment, during its stay in the womb of the dame, conveyed it by an aperture in the lower part of the neck.

But further, when this deviation from nature does happen, and is not supplied in the manner I have hinted, the stomach is found empty, and there are few or no excrements in the guts†.

In fine, as the examples of such monsters are rare, neither extraordinary well vouched, nor often accurately examined, the arguments drawn thence against the nutrition of the foetus by the mouth can never be conclusive, and in my opinion are sufficiently obviated by what I have already advanced; therefore I shall go on to consider the second argument, which stands thus :

“ That the lips of all animals, even when naturally formed, are so closely shut before their birth, that it is as difficult to open them as their eyes or nostril; wherefore the foetus can receive no part of its nourishment by the mouth.”

But this is a fact which I refuse *ab autopsyia*, and do appeal to those who are conversant in embryotomy, whether they do not for most part find all, as well human as brute foetuses, when yet inclosed in the membranes, and swimming in the *liquor amnii*, to have their mouths more or less open, and even frequently observe that their tongues do somewhat hang out; but, since

† Regner. Graaff de mulier, organ. gener. inserv, cap. 15.

since I shall have occasion afterwards to prove this at greater length, I shall proceed to the learned gentleman's third argument, which is :

That though the mouth of the foetus *in utero* were open, and allowed to be capable of receiving nourishment by it, yet the *liquor amnii* in which it swims is not a proper pabulum for its support ; and this he takes to be sufficiently established by the following history : “ A certain woman for some considerable part of her pregnancy having laboured under a virulent gonorrhoea, but by proper applications was cured, though not long before her time was up, the physician, who attended, being curious to know the circumstances of her delivery, was informed by the midwife and several other women then present, that, when the waters broke, there was a stench so offensive, that some could scarce endure the room ; and the midwife assured him, upon the question, that it was from the waters that ill smell arose ; notwithstanding this, the child, which is a girl, and still living, was born well and healthy, but the membranes of the secundine were very tender and almost rotten : How can it then be imagined, adds he, that this child could live upon such waters for its food ? or how was it possible, if it had received any of them into its stomach, that it should not contaminate the tender viscera so as to have destroyed the foetus ? ”

I am so far from being of opinion that this history proves what Dr Bellinger intends, that I even venture to affirm it rather supports the very contrary doctrine ; for sure I am the foetus

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was in much greater hazard of being contaminated, by having such nourishment sent immediately into the blood by the umbilic vessels, than if it had received it by the mouth and stomach, for hereby its vitiated qualities might possibly have been altered: Hence Dr Pitcairn † affirms, that many acid substances, when taken into the stomach, do soon turn alkalious; and naturalists do unanimously agree, that there are many poisons, such as the virus of asps, vipers, &c. which are absolutely innocent when taken by the mouth, but carry along with them present death when immediately mixed with the blood: Thus we find the brave Cato, when marching the remains of Pompey's army through Africa, wisely animating the thirsty soldiers to drink of a spring that came in their way, which they were afraid to touch, because they found many serpents in it, by telling them:

*Noxia serpentum est admisto sanguine pestis,
Morsu virus habent, et fatum dente minantur,
Pocula morte carent ‡.*

And Celsus §, when speaking of the serpent's poison, says:

Non gustu, sed in vulnere nocet.

But I must own that alkalines, or even alkalescents, are not turned into an opposite nature in the stomach, and that many vegetable,

† Dissert. de opera quam praestant corpora acida vel alcal. in curat. morbor.

‡ Lucan. Pharsal. lib. 9.

§ Lib. 3. cap. 27.

as well as mineral poisons are deadly, though taken by the mouth; yet certain it is, that any noxious matter, when immediately mixed with the blood, does as certainly but more suddenly produce its direful effects,) as many experiments evince) than when the same individual thing is sent into the body by the ordinary passages. Hence Galen † tells us, “That nothing “has the same power upon the human body “outwardly as inwardly; for (says he) neither the venom of the viper, nor of the “asp, nor frothy spittle of the mad dog, are “alike mischievous when they fall upon the “skin, or enter into the stomach, as when “communicated to the blood by a wound.” But here indeed the tables are turned; for what is safe and innocent, when mixed with the blood, is rank and deadly poison if taken by the mouth; or else, what is fully as remarkable, the placenta has the faculty of separating the pure from the impure, and has the goodness to send the impure to the amnios where it does no harm, and the pure to the foetus where it does much good.

The last argument which our learned author brings upon the field, to prove the nutrition of the foetus to be by the umbilicus, is deduced from the analogy between the nature and use of the *albumenovi* and the *liquor amnii*; but as what he advances upon this head stands in opposition to the most valuable as well as self-evident discoveries of the learned Malpighius and Bellini, I shall make no other

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† De temperam. lib. 3. cap. 24

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return to it, than to compare the assertions of Dr Bellinger and the two just now mentioned luminaries.

Bellinger † maintains, that the cicatricula is always inseparably united to the yolk, but never adheres to the white, nor has any passages to it that are visible with a microscope; and thence concludes that the chick receives all its nourishment from the yolk, but never any from the white; and therefore infers, that the *liquor amnii* in viviparous (which is analogous to the *albumen ovi* in oviparous) creatures, can be of no use in the nutrition of their fœtuses.

But Bellini ‡ asserts, that, a few hours after incubation, the cicatricula naturally leaves the yolk, and ascends to the *folliculus aeris*, where it remains till the exclusion of the chick. Malpighius § and Bellini demonstrate, that the yolk communicates but little to the chick, till within a few hours before it is hatched, when it is drawn in wholly by the *ductus intestinalis Stenonis*, or rather indeed and more properly of Needham ||, and by it is conveyed to the *intestinum ilium*, to be voided soon after its exclusion: And therefore both affirm, that the chick is nourished mostly by the white, which is colliquated and forced into its bill by the *folliculus aeris*.

Having thus briefly discussed Doctor Bellinger's objections against the nutrition of the fœtus by the mouth, I go on in the next place to take

† Pag. 49.

‡ De mot. cord. prop. 9.

§ De format. pul. et de ovo incub.

|| De form. fœt. cap. 4.

take notice of another and third way, where-
by Alcmaeon of Crotona † supposed the foetus
to be nourished ; and that was, by drawing to
itself, as a sponge, nourishment on all sides of
its body ; and truly numberless experiments
do put it beyond doubt, that the parts and
membranes of animals are possessed of an ab-
sorbing or bibulous quality ; wherefore [it will
be no absurdity to affirm, that the foetus (by
taking up † some portion of the *liquor amnii* in
which it swims) is in part nourished by the sur-
face of the body, as our author taught, par-
ticularly during the three first months ; but af-
ter this period I am of opinion that these inlets
are in a great measure, if not altogether, obstruct-
ed and covered over with a whitish matter, at
first tough, (and without dispute the most vis-
cid part of the *liquor amnii*) but afterwards, in
a great many instances, dried by the heat of the
body into a kind of a crust well enough known
to the midwives, since every day it gives them so
much trouble to remove.

But I hasten to the fourth and last opinion,
which to me is abundantly probable, and teaches
that the foetus is nourished as well by the mouth
as by the umbilic vessels.

This notion of the nutrition of the foetus is
as old as the great master and founder of me-
dicine the divine Hippocrates, who, in his book
de Alimento §, and elsewhere teaches, that
nourishment is carried by the umbilicus, as in
his treatise *de carnibus* || he maintains, that
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† Plutarch, loco antea citato.

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the child in the womb with its lips compressed together attracts nourishment, &c. which last he enforces with two very masterly arguments, namely, that, unless the foetus had sucked *in utero*, it neither could deposite excrement, nor know how to suck so soon as it is born; both which I would further illustrate, were I not aware that this last mentioned book is commonly said to be spurious; and therefore any quotation taken from it can fix nothing upon Hippocrates that is not consistent with what is taught in such of his books as are owned to be genuine; wherefore I shall not now stay even to offer any arguments that might be brought to prove that there is not quite so much reason to suspect this book as is ordinarily alledged, in regard Hippocrates himself seems to have conjoined these two opinions for which I now contend, in his treatise *de Natura Pueri*, which, so far as I remember, has never hitherto been called in question, at least it is to be found in the earliest catalogue of the genuine books of this author, as given by Erotian: For there Hippocrates † maintains the first of these, by telling us, that the embryo is nourished by menstrual blood sent into it by the umbilicus: And, lower in the same book ‡, he points at the second; for there, after having taught from what part of the aliment the milk is drawn, and likewise having inculcated the doctrine of the inoculation of the mammary with the hypogastric vessels, by saying in express terms,

VOL. I.

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† § 5.

‡ § 21.

“ That milk is carried to the breasts and
 “ womb by the same veins; for these veins
 “ and others like them (says he) go both to the
 “ breasts and to the womb; and then adds,
 “ When this little quantity of milk is come into
 “ the womb, the child uses or enjoys it.” Now,
 if we reflect upon these passages, it will be ve-
 ry evident, that Hippocrates believed that the
 foetus was nourished by two different species of
 aliment: Hence, in a subsequent part of that same
 treatise, he expresses this very clearly, by tell-
 ing us †, “ That the foetus draws to itself the
 “ sweetest part of the blood, and likewise en-
 “ joys a little milk.” Which points as well at
 the menstrual blood carried to the foetus by the
 umbilic vein, as at the *liquor amnii* drawn in
 by the mouth; it is true this last is not said in
 express terms, yet I think it is plainly un-
 derstood: And thus we find Galen ‡, who
 is by all allowed to have understood Hippocra-
 tes best, alluding to these excerpts, when he
 tells us, “ Neither, when Hippocrates says that
 “ the first nourishment is brought by the navel,
 “ are we to think him ignorant of the foetus be-
 “ ing nourished by the mouth, for he has also
 “ spoke of this way.” We can never then
 imagine that he is here pointing at the passage
 above cited from the book *de Carnibus*; for
 there the nutrition of the foetus by the mouth
 is so expressly said, that Galen’s caution would
 not only be superfluous but impertinent: But,
 that this may be further evident, Galen looked
 upon

† § 40.

‡ Lib, An animal sit id quod in utero est? cap. 3.

upon the book *de Carnibus* as spurious, and therefore its title is not to be found in any of the accounts he gives of the works of Hippocrates, at least so far as consists with my knowledge; and this also is the opinion of Le Clerc *.

But, not to dwell too long here, this doctrine subsisted from the time of Hippocrates its author, till that of Laurentius † and Fabricius ab Aquapendente ‡, who brought it into discredit; under which it continued till it was again revived and well supported by the immortal Harvey §, who likewise maintained that the foetus was nourished both by the umbilic vessels and by the mouth, with this variation, that Harvey § substituted an albugineous aliment in place of Hippocrates's menstrual blood. Into which difference, as I am not now to inquire, so I shall proceed to establish this opinion in the best manner I can; but, in order to do this more accurately, it may be proper to consider (tho' ever so briefly) the embryo's gradual growth.

The impregnated ovum being shut up in the cavity of the uterus, by the contraction of its fibres, fluctuates and swims in these humidities which continually distill from the extremities of the uterine mucous vessels, part of which fluid penetrating the coats of the ovum, and passing by the pores of the skin into the homuncio (as Alcmaeon taught) must enlarge both,

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* Cap. 27.

† Lib. 8. cap. 6.

‡ De form. foet. cap. 3.

§ Exercitat. 57.

§ De ac. tabul. uteri.

so that their bulk will fill the capacity of the matrix, and then the beginnings of the veins in the placenta will be implanted into the extremities of the uterine arteries, through which part of that serum or lymph, which before fell into the cavity of the uterus, will now be carried to the embryo by the beginnings of the umbilic vein, and what is more than necessary is again returned by the umbilic arteries to the mother; thus for some time there is a continued circulation of lymph, until the umbilic veins are so much enlarged, that they are capable of receiving red blood from the extremities of the dilated uterine arteries: But when this does fall out, whether about the end of the third month, when abortions (as those who are acquainted in midwifery do know) most frequently happen, is somewhat difficult to determine.

However it perhaps may in this place not be unpleasant to observe the infinite wisdom of our great Creator, so evident in the singular and wise contrivance by which this circulation is begun and maintained; for at first the motion of the lymph and afterwards of the blood from the mother, to the tender embryo, is exceeding languid and gentle, being but easily forced along the contorted branches of the capillary arteries of the uterus, and propelled through the small beginnings and great length of the umbilic vein, by no other force than that of the subsequent blood, by which admirable mechanism the beating into disorder the parts of the weak and tender embryo by the rapid motion of the blood drove upon it by the reiterated pulsations

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of the arteries, (a hazard of which some dream-
ed,) is happily prevented.

Thus then in the first months is the embryo
supposed to be nourished; but, since the vessels
of the uterus, which do not communicate with
those of the placenta, will only separate a viscid
and transparent liquor, which, by passing thro'
the pores of the chorion and more delicate am-
nios, is thereby filtrated and made more fit for
the food of the embryo, and forms that liquor
in which the foetus swims, and which it takes
in by the mouth, as seems evident from these
following reasons:—

First, The fluid contained in the amnios, and
in which the foetus swims, is not an excremen-
titious liquor, but a *materia nutritiva*; hence
it is to be found in a very considerable quanti-
ty *, even before the parts of the foetus are
visibly delineated, and therefore sure it can ne-
ver be deemed an excrement; or, were it such,
Nature would not give herself the trouble to
form so fine and delicate a membrane as is the
allantois, if it served to no other purpose than
to prevent the urine of the foetus from mixing
with another excrementitious liquor. Nor can
the allantois be designed to keep the urine of
the foetus from galling and excoriating its skin,
when this would equally happen from the li-
quor in which it swims, if it were, as is alled-
ged, the *materia perspirationis*: But how evi-
dently does the being of the allantois demon-
strate the wisdom of a superintending Providence,
by effectually hindering the urine of the foetus
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* Harv. Exerc 56. & lib. de membr. & h mor.

from mixing with the *liquor amnii*, its food? But further, if it be true (as undoubtedly it is) that there is no communication or immediate * connection between the uterus and impregnated ovum, for at least the first two months, then certainly it must be acknowledged to be the *materia nutritiva*; for it does not alter the nature of the argument, that in this period it passes into the foetus, rather *per habitum corporis*, (as was before hinted,) than by the mouth; and thus, in mares and swine, there is no communication between the uterus and the chorion, till they be at least half gone †, which undeniably and demonstratively proves the *liquor amnii* to be a proper nourishment for the foetus, unless some sensible difference can be condescended upon between the liquor in these, and that of other creatures: But further, if this liquor was not nutritious, and actually consumed by the foetus, more of it would be found in the amnios, at or near the birth; whereas it is then ordinarily observed to be almost spent.

Secondly, The mouth, nay even its chasm, long before the lips are observable, is always open, as any who will take the trouble to blow a little air upon it by a pipe may soon be convinced of; for then they will remark its sides evidently divide, which yet by no means happens to the eye-lids, nor ears, though the same method is used; and that it continues to be so afterwards, is evident from an observation communicated by an author of regard ‡, who assures

* Harv. Exerc. 56.

† Fab. ab Aquap. de form. foet. part. 1. cap. 3.

‡ Heister, comp. anat. in not. pag. 147.

assures us, that oftner than once, in the cold winter season, he found the *liquor amnii* frozen, and continued through the mouth and oesophagus to the stomach; in a pretty large column; which not only demonstrates the *liquor amnii* to be a proper *materia nutritionis*, but even puts the matter beyond all dispute, that it is by the mouth this liquor is conveyed to the foetus.

Thirdly, There are examples of human foetuses which have been brought into the world alive, either altogether wanting the umbilicus and its vessels, or at least having the umbilic rope broke asunder some considerable time before their birth, as Chatton and Vander Wiel the father do relate †. Thus it is evident that the foetus may be nourished by the mouth alone, when the umbilic rope is wanting, as well as by the umbilic vessels, when monsters are brought forth wanting heads, which I think is all should be made of these particular instances and deviations of nature, from her ordinary manner of operating; and thus it is as well with this view, I have related these histories in support of my present argument, as to convince Dr Bellinger of a mistake he seems to lie under, when he tells us ‡, “That nature has brought the foetus of some animals to a degree of perfection in all other parts, without the assistance of head or mouth; but never without the umbilic vessels, which he even challenges the whole history of physic to contradict.”

But,

† Vander Wiel, vol. 2. observ. 32.

‡ Tract. de nutrit. foet. cap. 9.

But, that the force of these arguments may appear in one view, let me add by way of scholium upon them, that, seeing all the fœtuses of viviparous creatures swim in the *liquor amnii* (an undeniable *pabulum nutritionis*) and for the most part of gestation have their mouths open, we may safely *a priori* conclude, that part of this liquor enters that passage; and since we actually find the very same individual liquor in the mouth, œsophagus, and stomach, as is evident from Heister's observations, and that there is sometimes no connexion between the mother and infant, by means of the umbilic rope, whereby it can be sustained, as in the examples from Chatton, and Vander Wiel, we may likewise affirm *a posteriori*, that the fœtus has part of its nourishment from the *liquor amnii*, and that it is conveyed to it by the mouth.

But, if we go further, and observe the nature of that liquor contained in the amnios, and that found in the stomach of the fœtus, we will soon perceive that they agree in colour, smell, taste and every other sensible property, excepting that the stomachical liquor is a little more gelatinous, some of its thinner parts being sucked up by the absorbent vessels of the stomach, which more and more obtains in its gradual descent through the intestines, its nutritious particles being in the same manner taken in by the lacteals, till at last in the great guts it is very much thickened; and then it changes also its colour by the mixture of the bile and *succus pancreaticus* with it; whence it has the name of meconium bestowed upon it. But, in the last months, these liquors differ yet more

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more observably, for that in the amnios is vastly thinner, being more conquassated as well by the motions of the mother, as by the stirrings of the foetus; nay it even at this time acquires a saline or urinous taste, which is yet no argument against its nutritive quality; for nature gives a *folliculus aeris* to an egg, to attenuate the viscid white into the most subtile fluor †, which is not coagulable ‡, but evaporates like urine, thereby changing its insipid and inodorous substance into a saltish stenching nature, that it may be rendered fit for the nourishment of the chick.

In fine, if we remember, that in such instances where monsters have been brought forth wanting heads, mouths, or suppar to either, the stomachs of such are found empty, we may reasonably conclude that the *liquor amnii* is the same with the liquor found in the stomach of natural fetuses, and may be convinced that this liquor is conveyed thither by the mouth.

I have already answered (as much as this confined place would permit) the objections to this particular opinion, when I treated of the first and second way whereby the foetus is supposed to be nourished, and therefore might here put an end to the whole; and, though, I have all along chosen rather to reason from facts, than to introduce arguments depending upon uncertain hypotheses; yet, since nature is always observed to act after a very uniform manner, I shall, in order to illustrate further what I have been hitherto maintaining, subjoin two analogical arguments,

† Bellin. de mot. cord. prop. 8.

‡ Ibid. proposit. 6.

guments, and with these conclude this dissertation. The first whereof is taken from the analogy between the vegetation of infant plants, and nutrition of animal foetuses; for it is well known, that plants *in semine* have two different roots; first the seminal, whose fibres are inserted into the cotyledones of the seed, to convey to the plant its first nourishment from the mother-earth, and by which it is gradually extended, till it shoots out its second or plantal root, whereby it more immediately receives sap or nourishment from the ground; and thus for some time being supplied by both, the plantal root becomes at last large enough to nourish it alone; and then there being no more occasion for the cotyledones, they die and fall off. Just so the foetuses of animals have two roots, (if I may be indulged in the simile), the umbilic vessels, which, by the intervention of the cotyledones or placenta, derive a liquor from the mother for its nourishment, by which it is gradually increased, till the mouth and viscera (its second root) be formed and enlarged to receive part of its aliment also; then it continues to be sustained both ways till it become ready for the birth, when its seminal root, the cotyledones, fall off, or the placenta is separated, and the infant born; when, as all know, it is able to be wholly supplied by its mouth or plantal root.

But the last analogical argument I mention is taken from the apparatus for nourishing the chick *in ovo*, where we must observe, that there is a similar liquor, as well as vessels designed for the same uses, as in animals. Thus the

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albumen ovi is colliquated gradually by the *folliculus aëris*, and heat of incubation, and sent into the *cicatricula* or *amnios*, for the nourishment of the chick; as in animals the *liquor amnii* is elaborated and fitted for the aliment of the foetus, by passing through the pores of the chorion and amnion, the *albumen ovi* is always found in the mouth and gizzard of the chick, as the *liquor amnii* is observed in the mouth and stomach of the foetus. The *albumen ovi* is entirely consumed in the nourishment of the chick before it be hatched, and very little of the *liquor amnii* is left at the birth of the child.

Upon the whole, may we not, from a just analogical deduction, conclude, that the *liquor amnii*, in which the foetuses of viviparous creatures swim, serves for the same useful purposes as the *albumen ovi* in the oviparous kind; and that both are carried to their proper young in the same way, that is, by the mouth?

Sed meliores meliora dicant.

XIV. *Two examples of children born with preternatural Conformations of the Guts; by Mr JAMES CALDER, Jun. Surgeon in Glasgow.*

I. A Bout a year ago, I was sent for to visit a new born child that had a large share of its intestines lying without the teguments of the abdomen: I at first imagined the containing parts had been torn in the birth; but, upon examination, found the navel entire, and a perforation

foration half an inch above it, through which the guts had fallen out, with the skin closely united to them. The child seemed otherwise to be as lively and brisk as any new-born infant uses to be, and for 12 or 14 hours it received milk and syrups by the mouth, without any appearance of uneasiness; but, after that time, it vomited every thing till its death, which happened four days after, and all the while it had no passage by the anus. The guts, which were inflated, and had no peristaltic motion that I could observe, gradually inflamed, and, before the child died, were become perfectly black.

When the belly was opened after death, I found that the jejunum, all the ilium, and part of the colon, with the cæcum, had got out; the parts of the jejunum and colon, which were engaged in the preforation, were at that place so small, as scarce to allow a goose-quil to pass in their cavity: they were adherent to each other, and had no appearance of a mesentery.

All the other viscera were sound.

The mother could not remember ever to have been surpris'd, frighted, or hurt, during all the nine months of her going with child.

II. About the same time that I had the opportunity of observing the former case, I visited another child, which lived full seven days after the birth, in which time it had never voided any *feces per anum*, but vomited every thing it swallowed; which did not appear to have any mixture of meconium, bile, or any other coloured substance.

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The parents, who were both healthy and sound, having formerly lost several children with the same symptoms, desired me to examine the body of this child, to discover the cause of their death.

The stomach was in good condition, but the pylorus was very hard, and felt as if it contained some other substance, which appeared, upon opening of this inferior orifice of the stomach, to be a glandular like piece of solid flesh, so closely adhering to the pylorus all round, that there was no separating of it, and without the least perforation in it any where; so that the passage was quite shut up. Below this, the duodenum was divided into two; and the gut continued thus divided to about one third of an inch above the jejunum. Into the largest of these intestinula the biliary duct opened.

All the intestines below were distended with air, and only a very small quantity of meconium was to be seen near the podex.

The other viscera were all sound.

XV. *A wound of the neck with uncommon Symptoms; by Mr JOHN KENNEDY, surgeon-Apothecary in Edinburgh.*

Captain Robert Jackson, commander of the Sorlings man of war, betwixt 40 and 50 years of age, of a healthy constitution, and of a sober life, was wounded in a sea-fight on the right side of the thyroid cartilage, by a bullet which I discovered by the probe to pierce below the mastoid muscle. I dilated the

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orifice,

orifice of the wound, and dressed it up with warm *ol. catellor.* and applied a compress moistened with *Sp. V.* to the neck, keeping all on with a bandage.

Next day I carefully searched for the bullet, and, at last, felt it a little above the superior costa of the scapula. I cut thro' the teguments and trapezius muscle, and extracted two bullets of a musket size each, that had been cast together, and were joined by a small neck. I bled him, kept his belly soluble with clysters, allowed him a spare cooling diet, and endeavoured to promote the digestion of the wound in the common way.

The wounds cicatrized in five weeks, without any thing remarkable in their cure, except that, when the slough of the anterior orifice cast off, the breadth of a herring-scale of the thyroid cartilage was laid bare, and appeared as white as ivory, and incarned without any apparent exfoliation. But there were some other circumstances attended my patient, which seem to me remarkable, and induce me to send you the case.

No hæmorrhage happened during the whole cure, notwithstanding the bullet passed through among so many large vessels as lie behind the sterno-mastoid muscle.

Immediately upon the patient's receiving the shot, his right-arm, from a little below the neck, to the finger-points, became pale, quite cold, and benumbed, for which I bathed it with aromatic fomentations, rubbed it well with strong spirits, in which also a double rag was dipped and laid over the arm, with red
bays

bays to cover all. In about twelve hours after, the arm recovered some heat; but the thumb of that hand was seized with a violent pain, which kept him all night from sleep; and the next day the pain was so unsupportable, that he was in danger of turning delirious, though his pulse was scarce quickened, and he had no thirst, or other sign of fever. I again let him blood, injected clysters, and applied emollient and anodyne fomentations and cataplasms to the member, without any success or abatement of the pain. The torture he was in obliged me to have recourse to some gutts of liquid laudanum that night, which did not cause sleep, but freed him from pain till next morning, when the pain returned as violent as ever, and continued so till the dose was repeated, which had the same good effects as formerly; but the pain returned as regularly next morning as it had done before. The third night I increased the quantity of laudanum, and thereby procured him sleep.

Finding, by repeated trials, that the opiate effectually gave him ease, I not only continued his evening dose, but gave him a smaller one in the morning, by which he was tolerably freed from pain. As the opium became familiar to him by long use, it had less effect on him; therefore, I gradually augmented the quantity, till, after six or seven months, his ordinary dose came up to 250 drops of *laud. liquid.* In the mean time a great variety of fomentations, bathing in warm milk, thrusting the member into the reeking bellies of slaughtered animals, &c. were tried, but none of them did any service.

Two months after he had received this wound, not only his thumb was pained, as already described, but such another pain was felt at the joint of the elbow without either swelling or hardness in the pained parts, or in the parts between them; and the fore-arm remained free from pain.

At the end of seven months these pains began to abate; in proportion to this, I diminished the quantity of laudanum: But, as the pain became less uneasy, the feebleness of the member increased; and, in twelve months, the pain was gone, and the use of the arm was entirely lost.

About two years and a half after receiving this wound, he went to Bath, and used the waters there for a season: When I saw him after that at London, he told me he had recovered the full use and strength of his arm.

XVI. *An Account of a large Bone extracted from the lower Part of the Gullet; by Mr JOHN STEDMAN Surgeon at Kinross.*

IN March 1731, William Angus, a strong young man, servant to John Henderson, farmer in Wood of Coldrain, near Kinross, hastily swallowed a large piece of the bone of a cow's head, in a spoonful of broth: He made strong efforts to force it down to his stomach, and was almost strangled before he swallowed it as far as an inch and a half above the xiphoid cartilage, where, but towards the left side of his thorax, he complained of a most violent acute pain. About 24
hours

hours after, he walked a mile to have my advice, but in such torture, that, when I saw him, he could scarce either sit down or stand. He had eat none from the time of this accident, and with the greatest difficulty could sip down any drink, though his thirst was great. He complained much of sickness, and his pulse was quick.

The difficulty he had to allow any drops of liquor to pass into his stomach, made me despair of bringing away this bone by emetics, which, if they did not succeed, would undoubtedly make his case more desperate. I was also of opinion, that attempting to push it down into the stomach, by thrusting a sponge fastned to a piece of whalebone down his cesophagus, would have no good chance to relieve him, because of the strait passage where the gullet passes through the diaphragam, which would be still more straitened by the present irritation ; and I could not promise what effects the bone might produce after it was lodged in the stomach.

These objections to the common methods made use of in analogous cases, induced me to attempt an operation that I do not know is described by any author, which was the extracting it by the mouth. For this end, I caused a long rod of flexible steel to be made, and then bended each end of it into an oblong round, terminating at the extremity in a small button. This instrument I thrust down the gullet below the pained part, and then gently drew it up ; which operation I was obliged to repeat fifteen times, turning the instrument sometimes to one side, and then to the other, endeavouring

deavouring to engage the middle of the bone in the hook. Every time I introduced the instrument, he had a reaching to vomit, and always brought up a little blood with some other liquors. At the last attempt, which was an hour after I had begun the operation, I was lucky enough to bring the bone away, which, with the instrument then used, I herewith send you.

Tab. III. Fig. 1. Shows the shape of the instrument, and *Fig. 2.* represents the bone of the natural bigness.

Immediately after the extraction, he complained much of pain in his throat and breast, and continued, as he since told me, to be so much pained for a fortnight after, that he swallowed even the softest spoon-meats with excessive torture, was costive in his belly, had a thirst, found his pulse going swift, and was very sick, but walked about. On the 14th day, he thought to have died with pain; after which he daily became easier, without either vomiting or passing by stool any thing like pus, but observed that the hard stools he had were of a dark red colour. At the end of twenty days, he was quite free of pain, and he has continued in perfect health ever since.

XVII. *An uncommon Tumour of the Breast; by Dr PETER PAION, Physician at Glasgow.*

A woman about 38 years old, and to appearance of a good habit of body, shewed me a tumor which had been three months in

in her left breast; it was to the touch as hard as a stone, painful, and red all round, and protuberant in the middle. The woman, notwithstanding the trouble of it, continued at her work, having the tumor covered with a *diachylon cum gummi* plaister. By degrees the tumor turned softer, and at length a small supuration appeared on the most protuberant part. Six months after I first saw her, as she was reaping corn in the fields, this suppurated part broke, and a large bag fell out at the orifice, which she immediately brought me.

The ulcer in the breast, cured in a little time, by washing it morning and evening with brandy, and applying some *ung. basilic.* to it.

The bag that fell out of it was composed of several membraneous coats, the external of which was white and opaque, but the more internal were all pellucid; on the surface of the most internal, I observed two very small caruncles.

The liquor contained in this cystis, to the quantity of seven or eight ounces, was clear and transparent like water, but a little foetid to the smell, and bitter to the taste.

XVIII. *Improvements in performing the operation of the Paracentesis, or Tapping of the Belly;* by ALEXANDER MONRO, *Professor of Anatomy in the university of Edinburgh, and F. R. S.*

THE place where chirurgical writers determine the perforation to be made with the trocar in tapping the belly, is four or five inches

inches below, and as much to a side of the navel, or the point where a line at that distance from, and parallel to, the *linea alba* would be intersected by another line drawn perpendicular to the *linea alba*, at four or five inches below the navel. If this point is supposed to be determined on a healthy man of middle growth and stature, it certainly is a very safe and convenient place for making the puncture, for it is sufficiently dependent, especially when the person lies on the same side, there are no thick fleshy bellies of muscles to pierce, nor are the muscles entirely tendinous, but are become tendineo-carnous; and at this place there are no large blood vessels or nerves in hazard of being wounded: All which advantages no other part of the abdomen has: But then this rule of measuring four or five inches is certainly not to be applied to hydropic people, as being very precarious, and consequently very often dangerous; for, though the distance is taken in full measure when the abdomen is distended, yet, when the belly subsides, the perforation will be found nearer to the navel in proportion to the degree of distension: As for instance, suppose that the anterior part of the abdomen is distended by water to double its natural length and wideness; that, when the water is drawn off, this cavity is contracted to its natural size; and that all the parts have been equally stretched, and are again equally contracted; then, though four inches were taken both ways from the navel, it is plain that, after the contraction, the distance each way will be but two inches, so that the perforation is not depending enough, the rectus

muscle

muscle is pierced, and probably some of the larger branches of the epigastric vessels are wounded.

What undoubtedly is meant is, to make a proportional allowance for the quantity of distension, and some authors have said so much; but none of them, except Garangeot, have laid down any other general rule for chusing the place of tapping: He indeed says *, that the puncture ought to be made in the middle between the navel and spine of the *os ilium*; but, as this spine is of a considerable extent, his rule is much too uncertain, especially considering that the precise point to be pierced can be determined in all subjects and different degrees of distension which the belly suffers in dropsies, by only remarking that in a sound state a point four inches below, and to a side of the navel, is the middle betwixt the navel and anterior spinal process of the *os ilium*, and that the muscular parts of the abdomen are nearly stretched in the *hydrops ascites apertus*; whence it follows, that this middle point between the navel and this spinal process is invariable, or nearly so; and therefore is the part where the perforation ought always to be made in tapping.

Till of late that Dr Mead, by pressing on the abdomen with an assistant's hands, while the water of the *hydrops ascites* was evacuated, discovered the sudden taking off the pressure from the descending aorta in such subjects as scarce have blood enough to fill the vessels of the body,

* *Traite des operations du Chirurgie*, tom 1. chap. 6. art. 1.

dy, to be the true reason of the syncope, inflammation, and great distension of the vessels of the abdominal bowels, and particularly of the intestines; surgeons were very careful to draw off a small quantity of water at once, and rather chused to repeat the operation more frequently, though they were sensible at the same time of several disadvantages attending their method; for, besides the pain and uneasiness to the patient, and the dangerous orifices made any where in the teguments of hydropic people are in of mortifying, the guts still lose more of their tone by soaking long in water, the air being necessarily admitted by the canula into the cavity of the abdomen, is liable sometimes to rarify, distend the belly, and form a tympanites, and never misses to hasten the putrefaction of the water, from which a train of various bad symptoms must follow:

All these evil consequences might then be prevented by drawing off all the water at once, and preserving the pressure still on the belly, which can be supplied by art, but ought, for greater safety, to be done gradually and equally as the water runs out, which neither the pressing with hands in time of the operation, and applying a bandage afterwards, which is the practice in England, nor the swathing with a towel immediately afterwards, as I have seen done in the hospitals at Paris, are rightly calculated for; and therefore these several years I have always used a belt, of the form in Tab III. Fig. 3. made of fine flannel, covered with strong linen: The body of the belt A is only so wide as to reach from the spine of the

one

one *os ilium* to that of the other; to one end of this body strong tapes or ribbons B are sewed at a little distance from each other, and to the other end as many well polished buckles C are put. Near the inferior side of the belt, and at a small distance from each end, a little window DE is cut, which can be shut with two buckles G, and straps F.

When the operation of the paracentesis is to be performed, I mark with ink the middle point between the navel and anterior extremity of the spine of the *os ilium* of the side which I design to pierce; then I apply the belt with the flannel side next the skin, well charged with fumes of *benzoin mastich*, and such other drying and corroborating medicines, taking care that the point of the skin formerly marked with ink, shall be in the middle of one of the windows or openings of the belt; after which a linen compress, or piece of flannel, is put on the back, to defend it from being hurt by the buckles, and a long piece of flannel three or four fold is put under the buckles, that they may not fret the skin: And, lastly, the straps or tapes are put through the buckles and drawn a little tight, by which the water is pressed in greater quantity to the part of the abdomen where there is the least resistance, which will be the part uncovered by the belt, or the open window; and therefore that part becomes more prominent and tense, which facilitates the perforation, and makes a greater distance there between the containing parts and viscera, and consequently makes less danger of the guts, &c. being wounded by the point of the trocar.

Gradually

Gradually as the water is drawn off, the straps are pulled straighter, and if the patient will be ingenuous, the same pressure can be kept on the abdomen, all the time of the operation, and after the entire evacuation, as was on it before one drop of the water was taken away; because the operator has a very certain gage, the breathing, to judge by; for the difficulty of breathing which hydropic people labour under, being wholly the effect of the water pressing the diaphragm upwards, and thereby straitning the lungs, any force equal to that of the water pressing all the parts of the abdomen equally will have the same effect: For this reason the patient must, from time to time, acquaint the surgeon if he is sensible of his breathing more freely, when the straps are to be drawn tighter, till the patient judges the difficulty of breathing to be the same as it was formerly. In this way I have drawn off more than once, from very feeble emaciated patients, sixteen Scots pints, or sixty four pounds of water at once, without the least faintness or uneasiness.

After all the water is evacuated, which is greatly assisted by the pressure, a pledget and plaister are to be put on the orifice, from which the cannula was taken in the common way; and, a compress being applied over these, the window is to be shut on this, and brought to the same tightness with the rest of the band. At pleasure this window can be opened and shut, and the wound can be dressed, and the whole belt may, as occasion requires, be slackened or straitned.

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In Tab. III. Fig. 3. this belt is represented.

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|----------------------------|------------------------|
| A. Its body. | F. The small straps. |
| B. The straps. | G. The little buckles. |
| C. The buckles. | H. The window shut |
| D. The window. | up. |
| E. The part of the belt | I. The straps and |
| that closes up the window. | buckles. |

The belt just now described is what I have only made use of hitherto, but have sometimes been sensible of inconveniencies in applying it when the belly is very greatly distended; for in such a case the *ossa innominata* kept the belt from being right applied to the lower part of the belly, which is stretched down over the patient's thighs; the superior part of the abdomen, being considerably smaller than the lower, is not sufficiently straitened; and after the operation is finished, the belt is liable to be gathered all in wrinkles round the loins, especially if the patient is restless and careless.

To prevent these inconveniencies, I think a further improvement may be made to the belt: See *Tab. III. Fig. 4.* Let a slanting flap K be added to its inferior edge; from which let two straps LL, with buckles at their extremities, go out to pass between the patient's thighs, and to be fastened to other straps MM, which come out from the upper edge of the circular band, or to a scapular bandage brought over the patient's shoulders: It is evident that the flap K will compress the hypogastric region, which the circular belt could not reach; and

that the additional straps being tightly drawn, will keep the circular band stretched at its full breadth.

Since this improvement was proposed in our first Edition, the belt made in this form has been frequently used here with success.

XIX. *Worms evacuated at an ulcer of the Groin; by Mr JAMES DOUGLAS, Surgeon to General Sabine's Regiment.*

WHILE the regiment I have the honour to serve in was quartered at Portsmouth in September 1731, a woman belonging to it was taken with gripes, vomiting, and costiveness, which continued five days, notwithstanding all I could administer; but at last, by the frequent use of lenient clysters, she had some stools which eased her gripes in a small measure, the vomiting still continuing, with several symptoms which seemed hysterical; wherefore I gave her internal, and applied external medicines for this intention.

On the eighth day of her illness, she vomited a worm of the teres kind about a foot long, whereupon the complaint of her stomach abated, her gripes still continuing, yet not so violent as the first: She now informed me of a tumor she had above a year and an half in her right groin; she would not allow me to see it, but told me it was as big as a small hen's egg, and by gentle pressure with her hand receded, and never gave her any pain till now. I judged this tumor to be a hernia, and advised the application

plication of an *empl. ad herniam*, with compress and truss, which she thought eased her about three days.

When I visited her the fourth, the pain was much increased, and she felt a pulsation in the tumor; I then prevailed on her to let me see it, and was surprised to find a large inflammatory tumor tending to suppuration, without any swelling of the inguinal glands: Her other complaints in the mean time abated, from the use, as I think, of the following bolus, which she took morning and evening ever since she vomited the worm; *R. Æthiop. mineral. gr. xxiv. calomel. gr. iii. conserv. ros. rubr. q. s. ut fiat bolus.*

I applied a suppurative cataplasin two days; and on the third, which was the fourteenth of her illness, opened the tumor with a caustic in the common way, and discharged near four ounces of a sérous-like matter: I then dressed the ulcer with some red precipitate, and pledges covered with *ung. basilic.* with which a little *ol. terebinth.* was mixed; over these I put a compress wet in tepid *sp. V. camphorat.* and kept all on with the T bandage: After three days dressing in this manner, the inflammation and tumefaction, which had extended from the *mons Veneris* to the anterior spinal process of the *os ilium*, were much abated, the discharge from the ulcer was small, and the matter was less foetid and better digested, whereas at first the sloughs that were taken off were so foetid, I could scarce bear the smell of them. Finding the ulcer now sufficiently cleaned, I dressed with common digestive only, and it

seemed to be in a fair way of healing very fast, without any accident till the twenty-third day, when, being now so strong as to sit up, I had given her this cathartic in the morning, *℞ decoct. fenn. unct. iii. tinctur. sac. drach. ii.* which wrought her pretty well, and coming to dress her about three in the afternoon, she shewed me a worm about five inches long, of the teres kind, which she told me had come out of the ulcer; and that she had forgot to inform me of such another having come away two days after my opening the tumor. Upon taking off the dressings, I saw the corner of the ulcer next the *os ilium* bloody, and searching there with my probe, penetrated into the abdomen, which made me resolve to keep the ulcer open for some time, to allow a passage to any other of these creatures that were to be discharged. That same evening, her husband brought me another worm of the same kind, and ten inches long, which had come out of the ulcer as the patient was sitting at the fire-side.

On the twenty-sixth, I repeated her physic, with the addition of *pulv. jalap. gr. viii.* which gave her three stools, and all day there was a discharge from the ulcer, like the juice of leeks, which seemed to differ from what she passed by stool, only in being of a darker colour. This excrementitious discharge, accompanied sometimes with wind, continued some days longer from the ulcer, the patient having also a stool in the natural way every day.

The discharge at the ulcer decreased gradually till the thirty-third day, when nothing but

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but laudable pus was to be seen on the dressings; and, in a week more, observing no return of the excrements this way, I endeavoured to cicatrize the ulcer, which was done in a few days, by applying Turner's *ceratum de lapide calaminari*; in the mean time I took care to keep her belly orderly, without allowing her to be costive, or purging her.

She remained perfectly well above a month, when a very small hole broke out in the cicatrix, and discharged the thinner part of the excrement, but without any pain or hindrance from her business. It has remained in this condition ever since, with only a very small quantity of ouzing matter, notwithstanding her riding two hundred miles; and I believe she must ever be contented to dress it daily with digestive or the cerat, according to the different circumstances of the sore.

XX. *A Mortification of the Cuts in a Hernia cured; by Mr JAMES JAMIESON, Surgeon in Kelso.*

IN the middle of December, a vigorous labouring man, 28 years of age, who lives three miles from Kelso, was seized with a violent colic, for which he got next day a purgative medicine from a gardener that operated very well, but without removing his pain. The day following, a large swelling appeared in the right groin and right side of the scrotum, on the middle part of which a mortification, about the dimension of a shilling, was observed the

second day after; and on the third, the mortified part fell off, and was followed by a large discharge of excrements at the orifice, upon which all his pains ceased.

The first time I visited him was the seventh day of his sickness, when he was free of pain and fever; the tumor of both groin and scrotum were entirely gone, without any one's having made an attempt to reduce the gut, which certainly, by its descent, had formed the hernia. His excrements came out in great quantity at the opening made by the gangrene, and a grumbling noise of wind was heard in his belly. In handling the scrotum, I could not feel the right testicle, nor has it ever been felt since, though the patient is positive he had it before this disease attacked him. I inquired at all the people who attended him, concerning the quantity of rotten flesh that had been cast off, but could receive no information; all of it having been thrown out undistinguished from the excrements.

I caused him to be carried to this place next day, and brought all the physicians and surgeons here to advise his case. In the consultation it was determined to inject warm claret wine at the orifice morning and evening, and to keep constantly on the part a compress dipped in the same liquor, over which a four-tailed bandage should be applied: The patient to be confined to his bed; to be allowed only a milk diet, and to administer every day a clyster composed of a decoction of the emollient and some vulnerary plants, in which turpentine,

pentine, lenitive electuary and oil were dissolved.

This method seemed to succeed well for some time, the quantity of excrements passing at the groin gradually decreasing, and the evacuation by the anus being proportionally increased; whereas the largest share of the fœces was formerly voided at the preternatural orifice, and no bad symptom appeared till the twelfth day, when, no fœces coming by the groin during twelve hours, he was seized with sharp pains in the umbilical region, attended with continual vomiting and singultus, with tremors like those of an ague, cold sweats, and a low frequent pulse.

At the first appearance of these dreadful symptoms, I let blood of him plentifully, injected a laxative and emollient clyster every three hours, fomented his belly with a warm emollient fots, and made him frequently swallow spoonfulls of an anodyne cordial mixture. Having used these near twelve hours, the patient evacuated some hardened excrements at the groin, the symptoms began to abate, and gradually went off.

When the bad signs were all gone, we put him again on his former regimen, but mixed some *mel. rosar.* with the claret that was used for the injection; continued to foment his belly twice a-day; and in the time between the fotses, covered his belly with an emollient and gently aromatic cataplasim. We also added carminatives to the clysters.

From this time the discharge at the rings of the muscles daily diminished, and after six weeks

weeks nothing appeared on the cloaths except a small quantity of ichor that had no smell.

I ought to observe, that no part of the clysters ever came out at the orifice of the scrotum, and that none of the injection could be observed among the fœces which he passed the natural way.

A very little quantity of the ichor is still discharged from so small an orifice of the scrotum, as will not admit a probe. But there is no fulness nor hardness; his excrements come regularly the natural way, and he is otherwise in perfect good health, having herded cattle these seven or eight weeks past: I have however caused him to wear a truss by way of precaution.

This paper was sent us several months ago, and we have been lately informed by the author of it, that this patient has remained in perfect good health, has no discharge at the ulcer, nor occasion for a bandage since a week or two after the case was sent us.

XXI. Stones in the Kidney, with Remarks on the Operation of Nephrotomy; by Mr JOHN DOUGLAS, Surgeon in Edinburgh.

—Aged 53 years, of a robust make of body, having large muscles, and remarkably big blood-vessels, the veins of his arm at the common bleeding-place being to appearance an inch in diameter, was afflicted, since four years old, with a violent pain in his right
side.

side about the region of the kidney, from which he never was at any time perfectly free; but he often had tolerable intervals; otherwise he was very healthy.

In his younger days he was salivated by Dr Pitcairn's order, and had many different advices from several other physicians, but seldom got relief from any thing, but the drinking large draughts of warm water, even to the quantity of three Scots pints (12 pounds). He more than once suffered such violent pain for some months, that he was obliged to lie the whole time on a coverlet laid on the floor; the pressure of his pained side on the hard floor giving him some remission from pain. While the pain continued, all the urine he passed, after it had stood and cooled a little, became like gleet, or whites of eggs. He had often a diarrhoea, without any gripes, and could at pleasure even then refrain going to stool for a whole day. And in the same way he could retain his urine, till his bladder was so full, as to discharge near three chopins (6 pounds) at once. Several meats and drinks, such as eggs, butter, fry'd meat, punch, and white wine, gave him pain; small malt-liquor rather eased him, for which reason he for ordinary drank plentifully of it.

About the beginning of February 1731, he contracted a violent cough, which brought on a consumption, of which he died, March 29th thereafter; tho', by all appearance, before that time, his lungs were in exceeding good condition.

I was allowed to open his body before Dr Robert Lewis and Mr John Wallace surgeon; and having always been of opinion that there was a stone in his right kidney, I resolved first to imitate the operation called by authors *nephrotomy*, which is said to have been performed successfully by Dominicus de Marchettis; but I met with such difficulties, as give me great reason to wish that either Marchettis had given us the account of it, or that the previous symptoms of Consul Hobson had been set down, whereby we might be certain of the stones having been cut out of the kidney itself; and all suspicion might have been removed of its having already made its way through the greatest part perhaps of the containing organs. The difficulties, I mean, are the thickness of the common teguments and muscles which was in this body no less than $3\frac{1}{2}$ inches. When the peritoneum was laid bare, I observed the colon betwixt it and the convex surface of the kidney; after that gut was removed, a large nerve presented itself, lying just across the place where the kidney ought to have been cut. And the depth of my incision was now so great, that I found it impracticable to penetrate through the substance of the kidney into the pelvis; and therefore I turned the body into the common supine posture; and, opening the kidney in the ordinary way of dissection, I took out the two stones herewith sent. See *Tab. III. Fig. 5. 6.* The largest, *Fig. 5.* weighing half an ounce, was found in the pelvis. The figure of it you see is triangular, with its surface stuck full of small granula, as big as coriander-

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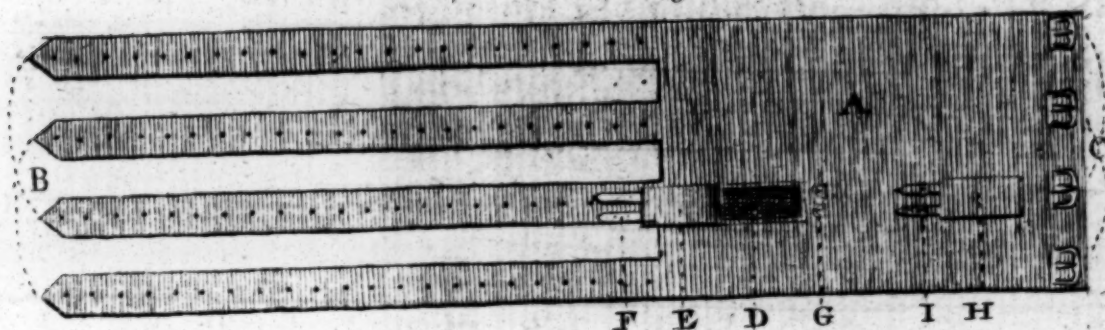
Tab III

Fig. 1

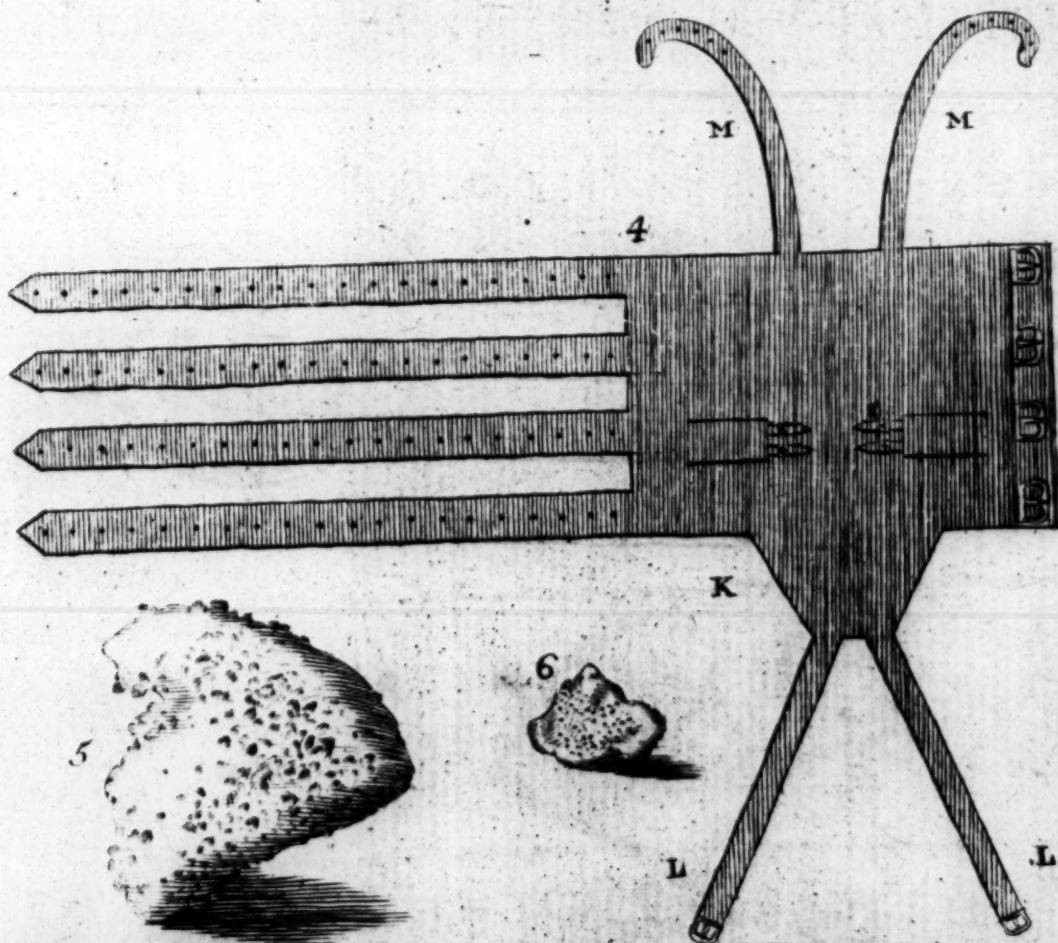


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ander-seed, which seem to have been united after the stone has been formed; for they were of different hardness and colour, being black, whereas the surface of the stone below them is brown and firmer. The lesser stone, fig. 6. which weighed 16 grains, and is of an irregular square figure, was lodged in the substance of the kidney. Besides these two, there were a great many other small stony concretions dispersed every where in the *tubuli uriniferi*; many of these were bigger than the largest grains of sea-sand.

XXII. *An Anomalous Tumour of the Leg, unsuccessfully treated, by*—————*.

A woman, about forty six years of age, after having been troubled several months with a tumour on the out-side of her leg, asked my advice. The external part of her leg was equally swelled, only about the middle it pointed, as we commonly call it, or was more prominent, red coloured, and felt softer; and, on pressing it with the fingers alternately, a liquor fluctuated below them. The pains of this tumour were so violent, that the patient assured me they had not allowed her, for some time past, to sleep a quarter of an hour at once. Her body was very lean. She had no appetite, but a constant thirst. The hectic paroxysms

* The author of this paper having claimed the performance of the promise we made in our proposals, we have complied with the desire of his letter, by suppressing his name.

paroxysms and night sweats came regularly every day. Every third day she was seized with a diarrhœa. Her menstrua had left her a considerable time before.

Imagining most of these symptoms to proceed from pus pent up and absorbed by the eroded vessels, I was of opinion they would probably abate, if that matter was freely evacuated by an external orifice. Having therefore applied suppurating cataplasms two days, and the teguments of that prominent part becoming thinner with the fluctuation still more evident, I made an incision of an inch and an half long with a lancet: In the cutting, I was sensible, by the resistance and grating sound at the edge of my lancet, that the tendinous aponeurosis was cut; tho' the incision was large and deep enough, not one drop of pus was discharged, only two or three ounces of mucus dropped out.

Next day I brought two surgeons in my neighbourhood to visit my patient, and, having taken off all the dressings except the pledgets which covered the orifice, I desired them to feel the swelling, and give me their opinion of it. They both affirmed their having felt the fluctuation of matter under their fingers. When the last pledgets were taken away, a fungus appeared at the orifice, which resembled the flabby *tunica cellulosa*, so often to be seen in the back and other depending parts of those that die of tedious lingering diseases. I cut off some of this fungus, put gentle escharotics on the remains of it, and dressed the rest of the wound

wound with suppurants. On the second day, the fungus came out much larger, and violently stretched the aperture of the teguments and tendinous aponeurosis, by which a gangrene was begun all round the edges. I cut off the fungus, enlarged the orifice considerably, and dressed it up with antiseptics and suppurants in the common way. In two days, the gangrened parts fell off, and, the aperture being now very large, I dissected from between the two bones of the leg, near a pound of that flabby substance. After having cut as deep as I durst, without risking the opening of the large arteries, I thrust a probe through that soft fatty substance, till I felt it and saw it striking against the skin of the opposite part of the leg.

Expecting therefore no success from this method, I resolved to perform the amputation as soon as the fever and diarrhoea, which were now come on, were abated; but neither were stopped by any medicines given, and in a few days the patient died.

The skin of all the leg appeared after death sound, but the *tunica cellulosa* and muscles were all degenerated into that pappy substance which had appeared as a fungus; and I could not distinguish one muscle from another, though I was at pains to dissect them.

The periosteum was every where separated from both tibia and fibula; between it and the bones, an acrid dark-brown liquor was contained; and the surfaces of the bones were rough and yellow.

I had occasion soon after to see a leg affected with just such another sort of tumor, but

it was opened sooner, before any other bad symptoms had come on. It would not cure with either external or internal medicines, and the patient would not allow amputation; so that it was palliated, till both surgeon and patient wearied of each other.

Pray, Gentlemen, under what class of tumors is this to be reckoned? Is it a-kin to the windy swellings of the joints? Or to what the French call the *fatty tumours*?

If you know the species of tumor, what is the pathognomic sign by which it is to be distinguished from *erysipelas-oedematodes*, or the slow phlegmons? for I am much afraid of falling into some such mistake as the former, unless you will explain the difference to me.

XXIII. *The larger Share of the Tibia taken out, and afterwards supplied by a Callus; by Mr DAVID LAING, Surgeon at Jedburgh.*

A Girl in the parish of Maxton, about seven years old, who never had any disease except the small-pox, accidentally hurt her right leg, and soon after, the teguments on the fore-part of the tibia swelled a little, but were not discoloured till two months after, when a redness about the breadth of a sixpence appeared on the skin, and an ulcer soon followed, which made the patient's parents ask my advice.

The child was at this time much decayed, her flesh and strength being wasted, and her frequent pulse, great thirst, and want of appetite,

petite, with other appearances of a hectic disposition, made the prognosis very indifferent.

I caused the part to be well fomented with emollients, and applied cataplasms of the same kind: But, finding no advantage by the use of these, and discovering by the nature of the matter that came out of the sore, and by the colour, softness, &c. of the flesh, signs of the bone's being affected, though it was not yet in sight, I made a small incision in the teguments to lay the bone bare, by which my suspicions were fully confirmed.

I soon now saw that the disease in the bone extended farther than the opening of the teguments; and therefore, from time to time, I enlarged the incision, till I came to the extremities of the affected piece of bone; which method I rather chused to follow, than to hazard making at once, in this feeble hectic patient, such a large opening as would have been necessary.

I dressed the sore with tincture of myrrh, caused the patient to take a decoction of the woods, with a small quantity of *aq. calcis* twice a day, and gave her an antiscorbutic and aperient medicated ale for ordinary drink.

After continuing these dressings and medicines about six months, the bone I send you was taken out. (See the fore-view of it in fig. 1. and the back-view of it in fig. 2. of Tab. IV.) You see it is the whole body of the tibia, the length of the superior part of what remained towards the knee, being three fingers breadth, and the inferior extremity towards the ancle, being only one and an half long.

In six weeks, the fore was cicatrized; and, in a month after, the child began to walk, before the callus was sufficiently hardened, which made it turn a little crooked, as it still remains, but is otherwise smooth, and as hard and firm as any other bone of her body: So that she walks, dances, leaps, &c. without the assistance of a crutch or staff, and without the least observable halt.

Towards the end of her cure, I gave her tincture of antimony, to remove a dry itch that was over her whole body. A considerable time after her leg was sound, a new ulcer appeared on the superior part of the arm, and now there are two sharp points of the *Os humeri* standing out at the orifice in the teguments. This attack on a part that never received any injury, makes me of opinion that the ulcer of her leg was not occasioned by a hurt at school, which the parents assign as the cause of the disease, but that it was rather owing to her bad habit of body.

Mr William Carlyle, apothecary in Carlisle, favoured us lately with a history of a case very like to this. The part of the tibia which was taken out is seven inches long; the boy to whom it belonged was twelve years old; the cure, which was almost entirely performed by nature, was two years in being completed; and there is no inconveniency remaining, except that the patient cannot stretch the heel of the leg out of which the bone was taken so well to the ground as he does the other.

XXIV. *An ESSAY on Mr Garengot's good Manners and universal Learning, inscribed to the Memory of Dr Friend, by — Prentice to a Surgeon-Apothecary in Edinburgh.*

Inops, potentem dum vult imitari, perit. Phædr.

* IT is certainly just, that, in matters of philosophy, every one should be at liberty to give his opinion, and to redargue what others have advanced: But there is a certain decency of expression which ought to be observed in all disputes, especially when those whom we undertake to refute are men of at least equal character to ourselves, and who have otherwise given good proof of their learning and ingenuity, employed in the service of the public: Whoever transgresses in this piece of prudent good manners, cannot complain if he should be attacked in his turn with some severity.

The design of this preamble is to introduce a few remarks on an author whom you seem engaged to take some notice of, if I rightly understand your proposals; it is Garengot, who, in

* This young gentleman either misunderstands our proposals, or forgets the promise in his preamble, of using no expression which might trespass against the rules laid down to our correspondents: For we must think that he has not shunned offensive terms, and personal reflections, even when he pretends to make great compliments; and therefore nothing less than the regard we have for the memory of the learned Dr Friend should have prevailed on us to insert this paper. We desire no more such may be sent us, otherways their authors need not expect that we will publish them,

in the preface to the new edition of his *Chirurgical Operations*, in three volumes 12mo, warns us, that he is to censure several people, but assures us, (p. 15.) "It is to be with good manners, and that charity we owe one to another." In his book he appears to have quite forgot this promise, particularly with regard to an author who is universally acknowledged to have been an accomplished gentleman, a fine scholar, and an honour to his profession. It is true, Dr FREIND in part deserved the usage he has met with from Mr Garengot, for stooping so far beneath himself, as to give occasion to the dispute

The Doctor, alas! is no more; his ashes are insulted, and none appears to vindicate the injury, which has engaged me to send you this paper, in hope it may excite some other to treat Mr Garengot in a manner suitable to the politeness of the following sentences, (p. 404.) "*Voila la seule consideration qui m'a porté à relever les VETILLES de Mr Freind.*" And (p. 428.) "*Ainsi sans faire attention à des objections qu'un ecolier se fût bien gardé de faire.*" These are very handsome flourishes, "The impertinent trifles, or old woman's tales of Mr Freind. The objections of Mr Freind, which a school boy would have taken great care not to make, or would have been ashamed of." It would ill suit me, who can at present assume no other character than of an *Ecolier*, to retort on a *Demonstrateur Royal* in language the least of kin to this; therefore, in examining the dispute that has occasioned these strong words, and in some more remarks

marks on Mr Garengéot's first volume, I shall be greatly on my guard to use no unbecoming expression, which might trespass against the rules laid down to your correspondents in your proposals.

Dr Freind had said, that Mr Garengéot's distinction of a dropfy into that by *epanchement* (effusion) and *infiltration* is not just, and that the latter is not a word in any language. Mr Garengéot answers this, (p. 403.) with a *Voilà une remarque de Mr Freind qui sent bien un homme peu instruit de la langue François*. If I should be told, that my assertion smells as strong as any expression of Dr Freind's, of a man who is ignorant of the French language, I must say that Dr Freind was not in such a great mistake, notwithstanding the use and custom of all the *Garçons* and *Compagnons* of the Hotel Dieu.

I affirm this with great confidence, because Mr Garengéot is of my side; for, in copying Dr Freind, without acknowledging him, he has explained both sorts of dropfy depending on the same cause, and produced in the same way, only the cavity of the abdomen is the place where the *serosité* is poured out in the one case; and p. 39^a. "it is *epanché et infiltré* "into the fatty cellules in the other." Whether then is not a distinction of names unnecessary, by which neither the manner of a disease forming, the causes on which it depends, nor the seat of it are distinguished? and therefore is it not right to say, that, if *infiltration* is a word at all, it is not justly applied here, and conveys no idea? It is Mr Garengéot's business

ness to shew that *infiltration* is French; I know *filtrer*, *filtration*, are French, as *filtrer*, *filtrate* are English; but I am not so well persuaded of *infiltrate* being used by any standard author of either language.

The objections unworthy of a school-boy were made by Dr Freind to an account of the syncope after tapping, formerly asserted by Galen*, and repeated by Aquapendente†, and now as fondly embraced by Mr Garegeot, as if it was the genuine production of his own profound meditations. I shall not take on me to determine how far either the Doctor or Mr Garegeot is in the right or wrong; but I think it is evident, Mr Garegeot has not refuted Dr Freind's opinion, nor sufficiently proved his own. To shew the falsity of Dr Freind's account of the syncope, it was necessary to have brought good proof of no effusion of new ferrosities into the abdomen happening after the paracentesis, which our author does not attempt; and he has taken very effectual care to disprove his own opinion of that symptom depending upon the diaphragm being pulled down by the weight of the liver; for he has expressly ordered the patient to be put in a lying posture, and has bestowed two plates to shew him in that attitude, when the tapping is performed. If Mr Garegeot had vouchsafed to consider, that, when one lies horizontally on his back, the hypochondria are the most depending parts of the abdomen, and when we lie on

either

* Comment. in Hippocrat. aphorism. § 6, aph. 27.

† De chirurg. operat.

either side, the hypochondriac region of that side is lowest, he would readily have discovered, that since, according to him, the liver and other viscera are not determined by any other power to any particular situation, but are left after tapping to act by their own gravity only, they would have no such effect as he acknowledges, when the patient lies either on his back or right side; and, if he lie on the left side, the liver would only pull the right side of the diaphragm, where the pericardium is not fixed to it. Thus it is to be a most subtle anatomist; such gross things must escape one who is judiciously employed in counting every little production and doubling of a cobweb *, while others of a much lower rank than Dr Freind must be content to take up with observations *qui sautent aux yeux*, that obviously strike the eye.

But further, it ought to be remarked, how much our author seems to differ for once from the principal, I had almost said the only person he has any extraordinary regard for, who, in p. 392. of this same first volume, accounting for hydropic people being like to suffocate when they lie, says, “*Les malades etant couchés, les eaux qui sont dans le ventre font autant d’effort en haut qu’en bas, ce qui pousse considérablement le diaphragme dans la poitrine.*” If the waters can, as he says, make as great an effort upwards as downwards in this lying posture, is not the diaphragm as low as the navel

* See description of the peritoneum in the splanchnology.

navel and hypogastric region? and, since all bodies acting by their gravity naturally tend to the depending part, should not the liver, &c. push the diaphragm considerably into the thorax, as well as the waters do? The contrary of which Mr Garengot has asserted to be true, though he had (p. 154.) brought an observation of Mr Winslow that proves the descent of the liver in an erect posture, and consequently its ascent in an horizontal situation.

Among a great many passages where our author with equal justice refers to his splanchnology, there is one on the subject of this dispute which appears singularly curious, (p. 427.) His principal argument for proving the liver's weight capable of disturbing the action of the heart, is founded on the conoid figure of the pericardium, which, says he, "j'ai fait ainsi gravé le premier dans ma splanchnologie." That he should be the first who caused the pericard to be engraved of a conoid figure, is a surprising discovery; pray, gentlemen, what is the figure of it, as it is represented in Vesalius, Eustachius, Bauchinus, Bidloo, Cheselden, Heister? I can scarce admit an apology offered here in behalf of our author, by some of my fellow-pupils, viz. That the text of these books being Latin or English, they are not to be supposed of Mr Garengot's acquaintance; for these gentlemen have certainly forgot that the language of pictures is universal.

Mr Garengot gives another strong hint, in a line or two after, of such another discovery: "For, says he, if the heart is situated transversely in that membranous base, as I

" have

"have demonstrated beyond all doubt." Truly I believe the transverse position of the human heart has not of a long time been called in question.

A propos of our author's splanchnology, to which we are so often referred, *voilà* another manner of making references to it, which our author might, for some certain reasons, have expected would some time or other be pointed at, and that is, to turn up in the splanchnology the descriptions of such parts as are said to have been demonstrated publicly many years ago, or before 1727 or 1728, by an author who is above all exception as to his veracity and *prisca fides*, I mean Mr Winslow, in the 4th and 5th volumes of his *Exposition anatomique de la Structure du Corps humain*: Where the descriptions are alike, let a *nota* be put on the splanchnology, and then number the remaining discoveries in it, you'll certainly after that admire several remarkable qualifications of Mr Garengot. Lest you should think me to have mistaken Mr Winslow's design, allow me to refer to one of the best judges in anatomical matters, who has been at some pains to explain the private history of the splanchnology, *viz.* Heister, edit. 4. *Compend. anat. monita in splanchnolog. Garengot.*

Another passage in Dr Freind's book, where our author seems to think the Doctor's ill humour at his confinement may have tempted him to do Mr Garengot injustice, is in the preface to the 1st volume: "The sheets which treat of an inguinal hernia were printed off," says the Doctor, before I had seen the trans-

“ station

“ station of Mr Garengot’s surgery, who is the
 “ only writer, I know of, that has taken no-
 “ tice of a crural rupture; however the sub-
 “ stance of what is here said on that subject
 “ was explained in a public auditory fourteen
 “ years ago.” What cause of offence should
 be contained in these words, I was at a loss
 for some time to discover; but, after being bet-
 ter acquainted with the genius of my author, I
 found an unpardonable fault in Dr Freind, to
 allow his book to be printed before he knew of
 Mr Garengot’s, or to pretend to have any no-
 tion of this disease without being taught it by
 this gentleman; at least, the Doctor should not
 only have given him the honour of being the
 first who wrote on the subject, but ought to
 have acknowledged *qu’il a été bien au dela*,
 (p. 261.) which I would interpret, That he
 was as far from the honour of the discovery, as
 he would persuade us the substance of what he
 said was beyond what the Doctor has wrote on
 this subject.

Mr Garengot’s historical account of the dis-
 covery of a crural rupture, is certainly a most
 exquisite master-piece of learning and criti-
 cism; he says, (p. 240.) “ If the crural her-
 “ niæ are not found described in books, except
 “ in two antients;” and in the next paragraph
 he quotes these two antients, Paul and Bar-
 bette: Would not one think, by our author’s
 coupling these two together as antients, that he
 leaves us at some loss to know whether by Paul
 he means the apostle, or one of the *principes*
artis medicæ, or if both passages are from Paul
 Barbette. The difficulty there is of purchasing
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any of the three in French at Paris increases the suspicion. But to shew you how favourably I would wish to explain Mr Garengeot's words, I shall allow him to have learned from the French translation of Dr Freind's history that there was such a man as Paul of Ægina, and then you know there is nothing in a *maitre des arts* bringing under the same class one person who lived in the end of the last century, and another who flourished a trifle of ten centuries or a thousand years before. Let us therefore suppose ourselves extricated from this trifling piece of chronology: There is, I must own, some difficulty to reconcile what our author writes in general of these two ancients and his account of Paul's words; for first, according to him, "The two antients say very little, and express themselves very confusedly;" And afterwards he introduces "Paul an antient chirurgicall operator saying, That the gut may be pushed into a cavity of the thigh betwixt the pectinæus and sartorius muscles, where the crural vessels descend." This is not saying much indeed, but is plaguily plain; and therefore our learned author, to shew this to be an incomplete and confused description, subjoins, (p. 241.) "Paul's remark is true, but the disease is not at such a height except in antient crural herniæ." No less sure than a master of arts could have contrived such a masterly solution of this difficulty.

Tho' at first view this argument may seem to be exhausted, yet I imagine this profound answer of our author would not be worse for some assistance, which, with all the humble de-

ference that even Mr Garengot can expect, I shall endeavour to give it. In the 1st place then, being supported by the true spirit of a critic, I suspect some interpolation in the text from which our illustrious author has copied this passage of Paul, for *peclinée* and *conturier*, (*sartorius*) or words of the same meaning in any language, were not used as names of muscles till long after Paulus Ægineta. 2^{dly}, The whole passage is spurious, Paul not giving the least hint of his knowing any thing of this disease. 3^{dly}, The plain reason of this historical essay being so embarrassed is, that Mr Freind, among his other *vetilles*, took the whim to write an account of crural herniæ when he was treating of Paul of Ægina, and that for no other reason forsooth, but because this same Paul seemed to know more of the other herniæ than his neighbours; and the said Mr Freind stuffed this account with words of his own, and three or four more Barbarians, whose names, if all put together, would not exceed *René Jacques croissant de Garengot* without the titles; and therefore the whole story could not be understood otherwise by our author than as a copy of the man's words whose name was prefixed to this part of the discourse. It is true there is a passage in our author which seems to imply some contradiction to this apology of mine; for (*p.* 248.) he says, "Mr Freind pretends that there is only the intestine which forms the bubonocèle." I suppose he gathers this from these words of the Doctor's history, (*p.* 166.) "Paulus says, that a bubonocèle always preceeds an enterocèle." But this is only done by

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by Mr Garengot with a design to balance accounts; for, in the former remarkable passage, he had borrowed from Freind to give to Paulus, and in this he compliments the Doctor with a passage of the Grecian, which you must acknowledge to be a notable instance of *sum-mum jus*.

You see how handsomely Mr Garengot has acquitted himself in the dispute with Dr Freind: But these proofs of his skill in argument and criticism, scarce deserve to be compared with the many notable discoveries in languages, physics, botany, chemy, pharmacy, anatomy, animal oeconomy, surgery, medicine, &c. &c. to be met with every where in his books; it is a pity some able hand does not undertake to set them in a due light: I neither dare presume to be equal to such a task, nor can expect you would allow such a work a place in your collection, but beg for once to be indulged, while, among such a great variety as almost makes one at a loss to know what to chuse, I point out one example or two of each sort of learning that occurs in the same volume in which *es vetilles du Mr Freind sont relevées*.

[We must here stop this young man's career; he has done with the defence of Dr Freind, which was the only motive we had to allow any part of his paper to appear, but, among the great heap of ill-natured remarks that we suppress, there are two or three observations which may be of some use; and, for this reason, we shall

take the freedom to strip them of their jocular air, and to communicate them in a plain dress.]

The rule of beginning to stitch a transverse wound of a muscle or tendon on the side where the greatest contraction of the muscle is to be expected, is, according to our correspondent, unnecessary, if not hurtful; because the passing of the needle and thread through that lip of the wound irritates the muscle to contract, and consequently, in the time that the other lip is in piercing, the first one will be retracted considerably from it, and hence there will be a greater difficulty in bringing them together; whereas, if the more contractile side was last of being pierced, the two might be brought together, and the threads tied without their being allowed to separate far.

He is of opinion, that a small compress of linen, or a piece of rolled taffetas put betwixt the knots, by which the threads are secured in an interrupted suture, do no service, and, on the contrary, gall the parts on which they rest.

He concludes his paper with these words. By bringing one example of each author, quoted by Mr Garengot, you will not now doubt how far his knowledge and candour are to be depended on; but I have been thereby tempted to make my paper longer than I designed; all I can say for myself is, that this article of his learning deserved most to be considered, because better judges than I seem to have thought it his fort, when they assigned him the office of making extracts of books; which extracts
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are to be published under the name of no less than an academy. After his talents in this way are set in their proper light, these gentlemen may possibly find it necessary to make a nicer scrutiny into this and the other branches of that great work, wherein the chirurgical academy lately instituted, and otherwise so well calculated for the improvement of surgery, is engaged; in which I wish them all imaginable success, and hope they will think good manners and accuracy no unnecessary qualifications to recommend their labours to the world.

XXV. *An ESSAY on the Improvement of Medicine; by Dr JOHN DRUMMOND senior, late President of the Royal College of Physicians in Edinburgh.*

IT is by accurate observations and just reasoning upon them, that physic can be brought to any degree of perfection; one of these is by no means sufficient for the purpose: The greatest masters of reasoning have often proved the most unsuccessful interpreters of nature, by neglecting to consult nature itself, and overlooking the most obvious phaenomena. Aristotle, with all the advantages of a great genius, and most uncommon opportunities of improving philosophy and physic, made no better use of these, than, from some abstract notions of matter, and certain fictitious elements and qualities, to account for the appearances in nature; and, fancying some chimerical

analogy between macrocosm and microcosm, between the political and animal oeconomy, endeavoured to make all things chime to this whimsical hypothesis. Physicians soon adopted Aristotle's notions, and reasoned from the same principles; for many ages nothing was to be heard in the schools but wrangling and disputes about words, useless divisions and distinctions of qualities and forms, and various glosses and interpretations of Aristotle's and Galen's writings: Not one dreamed of searching out the truth, of confirming or disproving any doubtful opinion by experiments and careful observations of facts, but relied entirely on the authority of their masters; the study of the institutions then in vogue, either confirmed so many wrong-heads, or made others mere empirics, not finding any certainty in the doctrines of the schools to establish a reasonable practice upon.

The chymists indeed threw off the yoke of the school-philosophy, and pretended to establish a new theory upon experiments, but these were few and very much wrested and misapplied; their fondness for some discoveries made by the help of fire, led them to quite neglect all other useful inquiries into the structure of the human body, the nature and properties of the liquors contained in it, and the laws by which they moved, and hurried them on to an extravagance beyond example, imagining such principles of action and such violent motions as are altogether inconsistent with the life of an animal.

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When the study of the mathematics was revived in Europe, then indeed might have been expected a thorough reformation of physic, and greater certainty than had hitherto obtained: *Des Cartes* soon attempted to apply mechanical reasoning to the animal oeconomy; but, though he had a profound knowledge of the mathematics, for those times, yet, wanting a perfect skill in anatomy, and a sufficient number of certain observations, he framed hypotheses to himself which were productive of many blunders.

Many notable mathematicians after him have succeeded no better in their attempts, merely for want of sufficient care to ascertain the data on which their reasoning is built; and too frequently it has happened, that those who are masters enough of the mathematics have not had time, opportunity, or genius for nicely observing the facts on which they were to reason, and others of a quick imagination have argued themselves into a belief of facts, contrived in their own brains, being real and true, because forsooth so much fine reasoning could never follow from a falshood; so that, however absurd we may think Aristotle's monarchical despotic government of the heart, or *Des Cartes's* flashes of fire contained in the parenchyma of that bowel, there are not wanting of their successors who have not been much more modest in their postulata.

On the other hand, many of the gentlemen who have employed themselves in making observations of facts, were utterly incapable of putting them to the right use, nor have they
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taken care to represent them in such a way as to be useful to others.

Your design, gentlemen, has the appearance of removing the difficulties that thus retard the improvement of physic, and I hope will introduce reason and experience united in perfecting this art; with a view to promote which, I take the liberty to submit some things to your consideration, which I have observed either very much to obscure and confound our conceptions about the genuine nature of distempers, or to seduce the unwary beginner from the rational method of practising, and to offer to your censure some hints for redressing these mistakes.

The complaint which Galen makes of the physicians in his time distinguishing too nicely the species of some diseases, rather for pompous names than for any advantage to medicine, is much more justly to be made now, when it has been the misfortune of this art to be loaded with such numbers of names to each disease, and such minute and subtle distinctions of them, by which a beginner, on viewing a catalogue of distempers in some of the systematic writers, will be apt to imagine, that each name denotes a disease very different from any other, and that he must learn a particular method of cure adapted to each; whereas, if the matter was duly considered, it would appear that these numerous lists might be much abridged, by reducing many diseases to the same class or general head. It is, indeed, scarce possible to find two cases in any disease strictly parallel in every circumstance; but it would

would be ridiculous, from every accidental circumstance in a case, to distinguish it with a new name, when the principal symptoms, which deserve most our attention, are the same in innumerable cases, and shew that they have the same common cause, the same general indications, and therefore ought to be reduced to the same class. Undoubtedly it would be of great use to students of medicine, or young practisers, to accustom themselves to form simple and distinct ideas of diseases, and in their first consideration of them, to set aside all the smaller differences and accidental circumstances, and to search out that which is of most consequence in any disease, and wherein it agrees with most others. Some examples will perhaps serve to illustrate what I mean.

Authors distinguish an hæmoptoe into a great many species, such as anastomosis, diairesis, diapedesis, rixis, and diabrosis, and write a great deal of the different causes of those hæmoptoes, and of the signs by which they are to be distinguished; which, however, are of very little importance: On the contrary, it would be more for the advantage of a beginner, to consider a hæmoptoe simply as a preternatural flux of blood, and as such it agrees with the hæmorrhagia narium, vomitus sanguineus, diarrhœa cruenta, hæmorrhoides, mictus cruentus, profluvium nimium mensium, &c. all which have the same immediate causes, the same effects and consequences, and suggest the same indications of cure, viz. in the beginning, the quantity of blood must be diminished, and a revulsion made by opening a vein in the arm,
foot,

foot, &c. the velocity and rarefaction of the blood must be moderated by cooling medicines: And, lastly, the dilatation or rupture of the vessel must be contracted and strengthened by astringents. It is true, that the situation and function of some parts, from which the blood flows, makes the disease more dangerous, the application of remedies more difficult, and their effects less certain in some hæmorrhagies than in others; yet the same method must take place in all; and therefore the general title of this class of diseases ought to be *hæmorrhagia*; and it would be as needless to treat of each of them as a distinct disease, as it would be to distinguish the rheumatism into as great a variety, because it seizes on the neck, arm, hand, leg, foot, &c.

Fevers have been treated of in large and numerous volumes, and have been distinguished into many species: Riverius reckons above thirty different kinds of this disease, and Sydenham has increased them to double that number; but certainly those authors and all other physicians have observed something common to all these diseases which made them denominate them fevers. The consideration therefore of this which constitutes a fever, (which upon examination will be found very simple and obvious), with its true causes and genuine effects, will give one a more just and clear notion of the disease, and lead him to a more rational practice, than all that has been said at so great length on those subtle and unnecessary distinctions, which one would be almost tempted to believe had only been made by observing

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serving the same disease in different persons: And, in this view also it will appear, that the most natural and useful division of fevers is into continued and interrupted; for I humbly conceive they may all, when considered simply, and not as the effect of another disease, be reduced to one or other of these two sorts.

Ophthalmia, angina, phrenitis, peripneumonia, pleuritis, hepatitis, nephritis, rheumatismus, &c. have all the same characteristic, and differ in nothing but the part affected; so that, if one has a right knowledge of an inflammation on an external part, its progress and proper remedies, and, at the same time, is thoroughly acquainted with anatomy, and the animal oeconomy, he cannot be at a loss to distinguish and treat any of the diseases belonging to this class.

Carus, cataphora, or subeta Avicennæ, lethargy, coma vigil, or typhomania Galeni, palsy, paraplegia, hemiplegia, &c. are nothing but different species of the apoplexy in a lesser degree.

Anasarca, leucophlegmatia, hydrops ascites, tympanites, hydrocele, &c. differ so exceedingly little, they scarce deserve the retaining so many pompous Greek names.

Some authors have distinguished diseases from their causes, though these do not, in the suppositions they make, alter the symptoms or method of cure; as for instance, Morton reckons among the species of phthisis those proceeding from diarrhoea, dysentery, gonorrhoea, hæmorrhagy, dropsy, and from forty other diseases; and perhaps there are thousands of remote causes more, which can produce a consumption, without vary-
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ing the common immediate cause of the disease, or the method of cure; and therefore needless to be enumerated.

These few examples may serve to explain what I intend, by proposing to reduce diseases to a few general heads, and may possibly give the hint to some abler pen to undertake a thorough reformation of useless names, to which, if they please, to tack receipts of extravagant length, where it is scarce possible to determine to what purpose most of the ingredients serve, except to increase the bulk of the composition, I am persuaded they would very effectually promote the art of healing.

Tho' I would argue for the usefulness of abridging the numerous names of diseases, and of reducing the unreasonable farrago of medicines in prescriptions, yet I would earnestly exhort all physicians to beware of falling into the opposite fault of prescribing, when they have only learned the general name of the disease, without having exactly and carefully examined all the circumstances both of the patients, and their diseases; for I am convinced, there is so little hope of obtaining any universal medicine to cure all diseases, that there is not any medicine proper for any one disease in all stages of it, and to all patients, except, perhaps, in preventing the effects of some poisons, of which we know no more than that some particular antidotes have done service; such is the salt, or rather the axunge of the viper, to the bite of that animal; and therefore your caution, gentlemen, in the article of your scheme concerning the histories of morbid cases, is certainly

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certainly just and necessary; for, without the patient's age, sex, constitution, &c. and the symptoms and circumstances of a disease are related, the observation is of little or no use; since practising by rote has no fairer chance for curing, than a blind man has to strike a dog, who stands barking at a distance: And this it is that principally must distinguish between a rational physician and a pretending empyric. As a proof of this, I shall cursorily mention examples of some of the most common diseases, where a particular form of practice generally prevails, and shall chuse out such as serve to illustrate the several necessary circumstances taken notice of in the article of morbid cases above mentioned.

Suppose two persons seized with an apoplexy, one is a full-bodied vigorous young man after a debauch, the other is an old feeble person, long subject to Catarrhs, I presume bleeding very plentifully must be the principal thing depended on for the cure of the first, and that this method would very effectually destroy the other, who must be treated with every thing that stimulates.

A rigid old man, and a healthy young boy, are both seized with an inflammation tending to a gangrene in their extremities; evacuations and topical emollient applications are proper for the boy, cordials and topical antiseptics for the man.

A man and a woman of middle age, healthy and vigorous, are, without any previous remarkable symptom, taken with a small hæmoptoe; the man is let blood of plentifully, is kept cool with a low diet, and has astringents given him;

him; the woman being near the time of her menstrua, is to have this natural evacuation forwarded, which proves her cure.

Two persons of the same sex and equal age, but one brought low by a disease, the other plethoric, catch an ague at the same time. The plethoric person requires to be blooded, and by other evacuations to have his vessels emptied; the other must be supported by a nourishing diet and cardiac medicines.

Two men of equal age and strength, one of whom has lived temperately and soberly, the other has every day drunk two or three bottles of wine at least, are both seized with a fever; the first is kept successfully at cooling emulsions, the other must have an allowance of wine; for, use them in there verse way, the temperate man will have his fever unsufferably raised, the other will become quite dispirited.

A child has complained of pains in his belly, shrieks frequently, grinds his teeth in his sleep, and has formerly passed worms by stool; a man has been seized some hours with a fever. Both fall into epileptic fits, which are to be cured in each by removing their causes; and therefore require very different treatment.

Two persons brought low, one with a fever, the other with a palsy of short standing, take each a quotidian or tertian ague; the first is to have his ague soon stopped; the other is to bear the ague as long as possible.

One man has been nigh exhausted with loss of blood, another has lived too fully for some time; both after exercise complain of a great *anxietas* and difficulty of breathing, with a faintness,

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faintness, inability in their limbs, and trembling all over their body; their pulses do not beat strong, and all the perceptible difference is, that the arteries of the latter feel hard and firm like a cord, while the former's pulse is soft, and makes no resistance; though the appearances in both are the same, yet this last circumstance, and the preceding history, determine the diseases to be exactly opposite; the one is from the emptiness of the vessels, the other from a plethora; and the method of treating them are directly the reverse of each other.

No rule is more general than that of blood-letting in pleurifies; but suppose a physician called in the fifth or sixth day of the disease, and sees the patient coughing up pus, blood-letting is so far from being requisite, that it is hurtful.

The common practice in the beginning of the small-pox or measles is to let blood; but, if the exanthemata are pale, the patient's pulse low and slow, without any oppression at his breast, cardiacs are of service, and evacuation by venæsection dangerous.

Authors seldom miss to discharge drawing of blood in a dropsy, yet suppose a strong man, after over-heating himself, and drinking great draughts of cold drink, to have his belly suddenly distended with water; and upon this to have a great difficulty of breathing, and all his veins very turgid, he must be bled, otherwise his disease will increase, and the circulation of the blood in the lungs will at last be entirely stopped.

To cure the jaundice safely in a plethoric person, especially if attended with an inflammation

mation of the liver, it is necessary to begin with taking blood, contrary to the general rule in this disease.

In the same manner, violent hysteric symptoms, occasioned by the over-fulness of the vessels preventing the menses to flow, are only to be removed, and the menses to be brought on by blood-letting, notwithstanding the general maxim of making no evacuation of blood at this critical time

I am afraid to be tedious, otherwise I could multiply examples of the same kind. In short, name any disease, and what medicine you please as universally useful in it, and I can promise to shew circumstances of patients, or of the disease, where that medicine would be very improper: Therefore let me intreat you to inculcate strongly to your correspondents, to consider well the cases of their patients, to leave the way of practising only in a routine, or by rote, to those who scarce deserve the name of empyrics, and to lay the foundation of their prescribing on experience and reason united; for of these it may be said as Horace did of art and nature in poetry,

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XXVI. *An Ulcer in the Lungs, piercing through the Diaphragm into the Liver; by Dr EDWARD BARRY, Physician at Cork in Ireland.*

AT the desire of Mr More surgeon to Colonel Groves's regiment, I visited one of his men, who, ten weeks before, had been seized with a peripneumony, attended with a pain in the lower part of his right side, that never was acute, but terminated in an abscess, and soon after broke. The pus which he expectorated when I saw him was very fetid; and, by lying on the opposite side, was discharged in a greater quantity. His body was much emaciated by frequent colliquative dejections, attended with a perpetual nausea. As he thus appeared to be in the last stage of the distemper, it was in vain to propose any method of cure.

About a fortnight afterwards, I was present at opening his body, with several other physicians and surgeons.

We found a strong adhesion of his lungs to the pleura, where he had a frequent pain, and to the diaphragm. Examining into the purulent cavity, which lay immediately under the surface of that adhering part, we found it continued through the diaphragm about an inch deep into the gibbous part of the liver, which closely adhered to the diaphragm. The length of this sinus was about six inches, and its diameter in the liver was about three, but more narrow in the lungs. The rest of the lobe of the lungs was entirely sound.

XXVII. *A Tumor in the Oesophagus from a singular Cause ; by Dr GILBERT WAUGH, Physician at Kirkleatham in Yorkshire.*

A Farmer named ——— Hart, in the village Micklebee, had a daughter violently afflicted with fits ; which, from their surprising nature, were judged by the neighbours to be the consequence of witchcraft : So that her parents were a long time in suspense whether they should call to her assistance a clergyman or physician ; but at last they agreed to call me.

This girl, about seventeen years old, though lean, appeared to be in good health, and went about the family-concerns chearfully. Upon asking the relations at what time these wonderful fits, of which I received so terrible a description, would seize her, the mother brought the girl a draught of fair water, which she attempting to drink, was seized with violent convulsions, and at last fell to the ground as dead. In about half a quarter of an hour, she began to speak, complaining of an intolerable pain in her breast, and a weight upon her spirits, or anxiety which she could not express, and with her finger pointed the part affected, which was under the upper part of the sternum, where it is joined with the clavicles. I could discover no signs of inflammation or tumor there ; but she insisted there was cause of complaint, though it lay out of my sight, and assured me that for the two last months she had
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taken no food, even the most slippery, without suffering fits of the same nature with what I had seen, but that of late they had grown worse. Inquiring what health she had enjoyed before these two last months, I was told she was then afflicted with a violent quinsy, accompanied with a high fever; and, when they expected that every minute she would be suffocated, the swelling about her throat suddenly disappearing, she was relieved in a great measure; but was sensible of a painful weight (as she expressed it) remaining in her breast, at the place she had pointed before, and from that time deglutition had met with some obstacle, which had daily grown worse. To this relation of the young woman, the parents assented.

I concluded this obstacle to be from a tumor, the consequence of the sudden translocation of the inflammatory matter from the fauces to the coats of the œsophagus. I was also sensible of the difficulty of attempting any thing to purpose, till nature should point out the way; but, as this conclusion would not be satisfactory to the relations, and I might appear negligent of my patient, I ordered a mild vulnerary decoction for drink, and an emollient fomentation for the breast. In short, in less than three days, the tumor broke, and the poor girl was almost suffocated with the stench and quantity of the purulent matter. Her parents very reasonably gave her a good quantity of warm water to drink; so, by straining to vomit, all the pus was squeezed out of its cystis; and, by vomiting, her stomach

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was relieved from what might have occasioned a diarrhoea, or worse, and she is now quite well.

XXVIII. *Spasms in the Oesophagus; by Mr JAMES AIRD, Chirurgion-Apothecary in Cumnock.*

ROBERT AIRD younger of Crosflet, aged eighteen, a strong well-made youth, troubled frequently with an itchy scurf on his skin, complained of colic-pains in the beginning of the year 1724, which grew violent early in the spring. They were attended with the following symptoms.

He was costive, and his spittle tasted salt or bitter for two or three days before the attack. His skin became free of the itch, and smooth on the approach of the fit. A violent drought arose, and an inclination to yawn, but he could not yawn freely. A pain and swelling began in the umbilical region, reaching upward to the stomach and both hypochondres. He had a violent head-ach, and reaching to vomit, accompanied with strong shivering all over his body. He threw up at some times bilious matter, and at others a saltish rheum. At last a stupor seized sometimes his legs, sometimes his arms, and sometimes both, during the paroxysm. His urine was clear and copious while the fit lasted, but turned turbid and red after it was over.

The first appearance of the declension of the paroxysm was a sweat trickling down his face, with an ability to yawn freely.

I was called to him in the second of these violent fits, in the beginning of March, about twelve at night. It had begun betwixt three and four afternoon, and was attended with all the above symptoms. I immediately bled him plentifully, which gave present ease: Next day he was vomited, and, with an intermission, purged once and again; which, with a regular diet, probably kept him free from any attack for some weeks.

In the month of April, he was seized with a dangerous fever, with starting of the tendons, &c. which lasted fifteen days, but went off by a plentiful sweat, and he continued well till

Thursday the 25th of May, when, after being three days costive, he was seized with another fit of his colic pains, more severe than any of the preceeding. All the symptoms formerly mentioned raged most violently, particularly the vomiting, with shaking and shivering to such a degree, as three strong men could hardly keep him in his chair. It lasted from three afternoon, till near midnight, and then went off of its own accord: But, on the paroxysm's declining, he was entirely deprived of the power of deglutition, so as he could not swallow the least bit of meat, or one drop of drink. He had a sharp drought, and some faint inclination to eat. He complained of a pain at the pit of his stomach, and on the left side of his throat. Being abroad, I did not see him till next day.

Friday's afternoon, I came, and found him feeble, yet able to walk about, and thirsty, but

but not able to get over the least drop of liquor, which he attempted frequently, but with so much pain, reaching to vomit, and threatening of being convulsed, that he was forced to give it over.

On Saturday the 23d, he continued in the same melancholy way. A physician, who had been sent for, arrived that afternoon, and left orders for a clyster, with the emollients and lenitive electuary, a tepid bath of milk and water, and a *S. Q.* of the following cataplasm, to be applied to the pit of his stomach, neck, and jaws :

R. Theriaca Veneta, unc. ii. Pulv. fol. mentha, drach. iii. Pulv. sem. absint. ii. drach. i. sem. Ol. macis per express. drach. ii. sem. Spir. vini camphor. unc. ii. Vini clareti q. s. ut f. cataplasm. molle. And, if these things restored his deglutition, to perfect the cure a vomit, and a *S. Q.* of the following infusion, to be given *diebus alternis*, so as to procure three or four stools extraordinary :

R. Pulv. rhei elect unc. sem Fol. mentha, pug. j. Sal. absinth. drach. sem. Spec. hiera picra, drach. i. Aq. cinnam. f. v. lib. sem. Agitetur phiola saepius per triduum, & f. colatura turbida. drinking whey, water-gruel, or chicken-broth, an hour after it.

While I was gone to cause the medicines to be prepared, a lady in the neighbourhood persuaded him to attempt swallowing down some delicate gelly or marmalad. He twice endeavoured to do it with great resolution ; but his courage cost him so dear, through the violence of pain, horrible nausea, reaching and convulsion

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vulsion of the parts, that he gave up any further trials. And no wonder, for he was not only fore spent, but, by the violent contractions of the abdominal muscles, he had forced the gut into the scrotum. This was immediately reduced, and he was laid to bed in a very hopeless way.

Sunday the 24th, he continued in the same way, without being able to get over the least drop or bit of any thing; neither indeed did he much attempt it, though he had no hydrophobic aversion, for he frequently washed his mouth with whey, but durst not gargle his throat, or endeavour to swallow any of it. At last, when he was brought very low, about seven at night, the medicines arrived from a very distant place. The cataplasm was immediately applied to his jaws, and to the forepart of his neck and stomach. In less than an hour, he could swallow a little drink; and, before ten at night, he could take down both victuals and drink. He was nourished with whey and chicken broth, and passed the night pretty easily; but his spittle continued to be very bitter.

Monday the 25th, he complained of little, except the taste of his spittle and weakness; on account of which I delayed giving him the vomit, and the rather that he had a plentiful stool, he having had no passage by stool or urine from Thursday that the paroxysm began.

Tuesday the 26th, he got a vomit of emetic wine in the morning, which brought up an immense quantity of curdled bilious stuff,
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by which he was greatly relieved: But, observing him pained by the spasm in the left side of his throat when he reached to vomit, I did not press him to continue vomiting, but put him to bed. He had some stools that and next day.

Thursday he began to use his purging tincture, by which he evacuated great quantities of bilious stuff. He took it every second day, till he consumed double the quantity prescribed; for he had it renewed, by pouring canary on the residuum, which purged him in the same manner. The more he purged, the more he found himself relieved; and the saltish and bitterish taste of his mouth gradually went off. After he had purged some days, he began (as he used to do very frequently in health) to sweat a little in the night, though he had sweated none all the time of his illness.

After his purging tincture was ended, he used some corroborating medicines, and was restored to perfect health; and has been free from any complaint of that kind now these eight years.

As to the hernia, he wore a truss for some time; but as he never had been troubled with it before that fit, so he has been free from it ever since.

Mr Aird's getting so easily free of his rupture, will appear the less strange, when I tell you of a gentlewoman, my patient; who, by lifting a great weight, from a table to the ground, had, in a moment, a *hernia inguinalis*, that gave her intolerable pain, till it was reduced. She was ordered to ly constantly a-bed for ten or twelve days,

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days, with a woollen-cloth six or eight fold, wrung warm out of a strong decoction of oak-bark and allum, with strong red-wine, pressed close on the part. All the time she was free of pain, and then rose in perfect health, and has since born children without a relapse, or any uneasiness from the rupture.

XXIX. *An Inflammation of the Stomach, with Hydrophobia, and other uncommon Symptoms; by Dr JOHN INNES, Fellow of the College of Physicians, and Professor of Medicine in the University of Edinburgh.*

A Young gentleman, well-made, of a florid blooming complexion, all his life healthy and vigorous, was last summer, on excessive walking in dry hot weather, suddenly seized with a sharp pain at the upper orifice of his stomach, soon after attended with difficult breathing; both which almost as suddenly disappeared on plentiful bleeding. Last winter he had some faint returns of the same, but, by gentle evacuations, keeping at home, and moderate diet, he easily got the better of them.

He lived very temperate, much at home, and in perfect health till the end of March, when he could only observe his appetite less, and digestion slower than usual.

April 2d 1732, he went to bed in perfect health, was waked next morning with a pain much like the former, tho' neither so exquisite nor equally sharp, but that he could make a shift to put off with it, and even at some inter-

vals to sleep a little, till ten next morning; when all of a sudden it became so violent, as to force him instantly to call out for his old cure, a plentiful bleeding; on which, for some minutes, he thought himself intirely relieved, but soon after complained of a strange anxiety, difficult breathing, coldness of his extremities, and convulsions of the diaphragm.

I saw him before eleven, when I found his pulse much oppressed, very irregular, and often intermitting, his extremities chilled, his breathing almost suffocated, fetching heavy sighs, and very often looking ghastly, spouting saliva frequently, and roaring out from a sharp burning pain gnawing his stomach; and now his pulse at the arm was scarcely to be felt, but at the temples was frequent and irregular.

After some hesitation he was blooded plentifully, on which his pulse became more full and equal, and a new heat was diffused over all his body, the pain remitted, and his breathing became free.

Twenty minutes after, his extremities became cold, his pulse feeble and irregular, his breathing oppressed, and his pain quicker than ever. He was immediately blooded, and seemed for five minutes somewhat relieved; then all of a sudden his extremities became cold and rigid, as of a dead body, his pulse at no rate to be felt; immediately he cried out, that every thing was turning round him with strange rapidity: Soon after that he scarcely saw objects, but imagined himself in such a motion, at last saw nothing; and, quite bereaved of all his senses, raved in the most extraordinary manner,

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manner, often starting up and tearing every thing about him, spouting perpetually great quantities of water, ready every moment to be chocked in his breathing, making no complaints of his former pain, but crying out in the most pitiful manner, how he was abandoned by all, and left among flames that were consuming him, vowing eternal revenge on all that had so used him.

The tone of his voice often changed, he had convulsions frequently in his face : At length, as if wearied out with this shock, he fell calm, tho' still pretty much insensible ; at which time, by the concurring advice of two other physicians, Drs Robert Lewis and James Eccles, he was plentifully blooded, on which he returned to the full exercise of all his senses, (except that of seeing distinctly) and seemingly to good health.

He had some intervals during that extraordinary shock, and called instantly for drink : But the moment he saw it, fell into the most surprising horrors, and, as it approached him, started, looked frightened, had frequent convulsions, especially about his mouth, and peevishly put it away with his hands ; and then with an air that spoke at once fright and resentment, he would stare after the drink, and soon after impatiently call for it, and repeated the same scene.

After this last bleeding, finding himself more than ever before relieved, he called hastily for a little warm milk and water, he greedily glutted in a mouthful, and that very moment, with great force, spouted it at a great distance,

and after it an incredible quantity of saliva in the same manner, with the same force and very frequently, telling that, notwithstanding all his burning thirst, to swallow it was impossible; nor could he, without a kind of horror, bear of any kind of drink, otherwise he was pretty easy till five that afternoon, when all the former symptoms recurring (tho' not so violent as last) instantly demanded a fresh bleeding; on which becoming easier, he passed that night free of pain and hard breathing, tho' without sleep.

Towards morning, he attempted often to swallow, and at last got down some drink, tho' with the utmost terror and pain. He had an emollient fomentation applied very warm to his breast and belly when at the worst, and fancied himself much benefited by it; but, as his pulse became fuller, and the natural heat more equally diffused over his extremities, he complained it made him sweat and faint.

From this last bleeding, his pulse was soft, full, and slow; he had an equable heat over his body, and a breathing sweat till next morning at nine, when his extremities gradually cooled, his pulse turned feeble, his breathing quick and laborious, and his pain sharp. He was again blooded; but, before five ounces were taken, he fainted; all the symptoms immediately disappeared, his deglutition easy, &c.

Next morning all his former ailments returned, and he was put under the same necessity to blood as ever; on it he was instantly relieved, and continued pretty easy till eleven that night, when all his former mischiefs recurred;

curred; he was blooded; but, before three ounces were taken, fainted: The symptoms however abated, but returned with double force at five next morning, when he bled freer and without fainting.

All this while it was with much pain he could take a little warm emulsion, not exceeding a spoonful at a time.

He had been from the beginning always confined to one posture on his back, and the least attempt to move himself never failed to waken his pain, which frightened him from the use of clysters often recommended.

He passed that day much sunk, weak, and dispirited, often fainting, till two next morning, when the old ails returning commanded immediate bleeding, which he bore better than the two last times; after this his pulse was softer, fuller, and slower by much than at any time before, and his pain easier. All that day he drank pretty heartily his emulsion and a little chicken-broth, till mid-night that he turned very ill, and without fainting bore a plentiful bleeding, on which his pain quite vanished, and next morning his pulse was very near to the natural, and he could now move himself without wakening his pain.

He had a discutient strengthening fomentation applied, an emollient carminative clyster with the digestive injected, which was retained, and another more stimulating repeated, which operated very well.

He had a retention of urine from an inability to expel it; but, on the second injection and fomenting the perinaeum, it went off.

He could now take down any thing without the least pain, his pulse was come to the natural standard, only he was extremely weak.

At eleven that night, he had a violent reaching to vomit, which lasted half an hour; he slept well till five next morning, when an excessive vomiting recurred, every thing stomachic or anodyne was immediately returned; but, after casting up a deal of green stuff, and on applying very warm cloths to the pit of his stomach, the vomiting was staid.

He now began to loath his milk and water, chicken-broth, &c. and had in place of them sack-whey, a very little solid food, veal gel-lies, &c. and, by this analeptic diet, in a few days, recovered health, strength, his former air, and successfully performed a long journey.

In the seven days during which this disease continued violent, the patient had about 116 ounces of blood taken from him.

XXX. *Loss of Appetite, and an Atrophy from the Stomach displaced; by Dr ROBERT LOWIS, Fellow of the College of Physicians at Edinburgh.*

A gentleman about sixty three years of age, of a gross habit, healthy constitution, and regular course of living, had from his youth been subject to an epiplocele: About the end of the year 1722, his appetite for meat began to fail and his body to waste; during his indisposition, he had not much thirst, and was generally

generally costive, till some weeks before his death that a looseness came, not excessive nor accompanied with gripes; towards the end of which, his stools had a mixture of some purulent matter and a very noisome smell: His urine for most part was reddish, in small quantity, and let fall a gross red ground; he never complained of any pain but what was occasioned by the piles, which went off in a week or two without bleeding. About two months before his death, he was sensible of a weight upon his stomach, in which time also he observed the hernia to increase much, and was troubled with frequent belchings: The three last months of his illness, he had great watchings; his pulse was full, strong, slow, and hard, and his breathing easy and free till a few days before his death.

At the beginning of his indisposition, he used no other medicine but some gently purging and stomachic bitters, fearing that vomits might increase the hernia; but, his disease still going on, about the month of July, he was prevailed on to take a vomit of emetic tartar, and after that several others at due distances and pretty strong, which brought up with much difficulty a quantity of tough, heavy, thick phlegm, by which he had some short relief; he used likewise bitter stomachic infusions with and without purgatives, and also such medicines as were proper to mitigate the most pressing or uneasy symptoms. He used moderate exercise in the country, a regular diet, and asses milk; but, his body still wasting, and his strength gradually

dually failing, he died the 25th October 1723: Upon the 27th his body was opened.

The first thing observable was, that, upon cutting the teguments of the lower belly, there appeared little fat, and the fleshy fibres of the muscles were almost entirely consumed.

2. The abdomen being fully laid open, there appeared very little of the cawl, and that reached scarce so far down as the navel, except upon the left side, where more than the half of it had fallen down to the scrotum, and was attached to the lower part of the left testicle, the annulus on that side being dilated so as to admit likewise two or three fingers.

3. By this falling down of the cawl, the stomach, which was very much inflated and extremely thin and smooth, had been pulled out of its natural situation, so that the pylorus tended obliquely downwards almost as far as the right side of the navel; and the gullet entered the stomach at an acute angle.

4. The liver was large, weighing about six pounds, and reached under the left hypochonder, taking up part of that space the stomach should naturally have possessed; upon its surface and through its whole substance were white steatomatous swellings, as also several ulcers, especially upon the concave side.

5. The gall-bladder contained a blackish bile, and the *ductus cholidochus* was so large as to admit two fingers where it entered the duodenum.

6. The pancreas was schirrous, but the mesenteric glands were no ways indurated; these and

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and every thing else in the lower belly appeared to be found.

7. In the thorax, the lungs were of a blackish colour, and, at the first division of the bronchi in the left lobe of the lungs, there was found a round hard body, about the bigness of a filberd, outwardly as black as ink; but, when the membranous cover was removed, appeared brownish, and was of a stony brittle substance, like to something he had once spit up in the time of his sickness.

8. The heart was extremely flaccid.

XXXI. *A Tympany*; by ALEXANDER MONRO, Professor of Anatomy in the University of Edinburgh, and F. R. S.

THE keeping of the register of patients, their diseases, &c. having fallen to my share in the management of the infirmary or hospital for sick poor lately erected here, necessarily obliges me to peruse with care the journal of all the cases treated in the hospital, and recorded by the physicians and surgeons; among which there are several (notwithstanding the small number of sick which the fund of the infirmary is yet able to maintain) that would not be unworthy of a place in your collection of medical observations: I affirm this with more assurance than can generally be done in behalf of hospital-cases, because the journal does not simply contain the name of the patient and disease, the receipts of medicines prescribed, and the time of the cure or death; but the

the preceeding history of the patient and disease, with the particular complaints and symptoms, are recorded at their admission; and every day after, all the changes happening to the sick, with the evident effects of the medicines, are inserted; at the same time the physicians are not confined, in ordering the diet of their patients, to the common fare of the house, but are allowed by the managers to cause whatever food or drink they think most fit to be given; and such of the managers who are visitors in their turns take care that these orders are executed.

Having permission from the managers, I have made an extract from the journal of the following case, only changing the form of a diary, and abridging what I imagine your design does not require, but was necessary in such a record: If this specimen of hospital-practice is acceptable to you, your yearly volume may always be supplied with some cases from the same collection.

Margaret Dog, aged twenty two years, was seized with a tertian ague in January 1729, and being then servant in a public-house, had no care taken of her, but was allowed to follow every idle prescription that was offered by any of her acquaintances; among a great variety of very uncommon medicines, she was persuaded to drink great quantities of brandy and powdered pepper in warm ale, which changed the intermitting fever into a most violent continued one, in which she was delirious several days; and, as this went off, the ague returned, but with two, three, four, and sometimes

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times five paroxysms in a day, which she often attempted to put away with all the vulgar specifics brought her: The disease however continued obstinately till August, when some doses of the bark were given her; after which she was attacked with sharp pains in her loins and belly, beginning commonly about the right *os ilium*, and rising upwards to cross over by the stomach to the left side, attended with gripes, borborygmi, and swelling of the whole belly; and for some weeks one of her legs trembled, became hot, and sweated at the same hour each day, while nothing like ague was felt through the rest of her body. The pains continuing, her belly became still more distended, and sometimes was stretched in a very short time to a great bigness, and then gradually subsided without evacuations of any kind, but always remained more swelled than ordinary. When winter came, she mended, and was for some time almost free of her uneasy symptoms; but, in the beginning of the spring, her pains and swelling returned, and, after suffering them several weeks, she represented her case to the physician and surgeon then in attendance at the infirmary, and was received as a patient there on the 24th March 1730.

Her symptoms at this time were a more than ordinary constant swelling of her belly, but sometimes increasing so monstrously, that the skin seemed to be in great hazard of being torn; and her breathing was much straitened: The swelling gradually decreased without any evacuation: The returns and degree of this swelling

swelling were very uncertain ; and, when the belly was most detumified, one could feel several unequal protuberant balls every where, but especially at the sides of the abdomen : Her stomach was good, she had no thirst, and her urine was in sufficient quantity in proportion to her drink. She was very costive ; her menses had returned at irregular periods for some preceeding months. There was no cedematous swellings in her legs, nor complaints of any parts else.

At her first admission, she took several doses of purgatives, which operated sufficiently, but brought little or no wind along with the feces, and altered the state of her belly very little. On account of her being irregular in her menstrua, and a suspicion of pituita in the *primae viae*, she was next ordered some doses of calomel, which produced very little change ; and, during two months thereafter, she was constantly taking large doses of the antihysterical medicines, either by themselves, or mixed with purgatives : The antihysterical plaister was kept always applied to her whole belly, and once or twice the semicupium was used, but without any appearance of the disease being cured, or certainty of the remissions she now and then had being owing to any particular medicine ; for, though the swelling did not increase for two or three, nay, nine days following more than once, yet the hardness and tumors of her belly did not entirely remove, her costiveness always remained, she had no passage of wind any way, and the medicine that at one time seemed to relieve her, was of no effect in the

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next return. From the time of her admission, she had her menses only twice, viz. May 17th, and June 21st.

During this period, there are some facts remarked in the Journal which seem worth observing. 1. Several times upon the swelling's falling, she complained of a head-ach, once upon the detumescence complained of pains thro' all her body, once of a giddiness, twice had a nausea and vomiting, and in the last threw up green bile; and once her stomach swelled greatly, when the rest of the abdomen subsided. 2. During the flowing of the menses, she did not swell, but became very big upon their stopping. 3. Bleeding and emetics, which were made use of for some accidental urgent symptoms, had no very sensible effects in making the principal disease either better or worse. 4. She never had passage of wind any way, except a little belching some days before the first monthly evacuation.

Some time before the last eruption of the menses, the purgatives were given more sparingly, and the doses of the antihysterics of the strongest kind, such as *assafœtid. ol. C. C. &c.* mixed with soap, were enlarged and given more frequently, and accompanied with the hotter antiscorbutics, as they are commonly called, *e. g. rad. raphan. rustic. recent. zinziber, &c.* infused in strong ale with steel. The patient was ordered to use frequent and strong frictions to all the trunk of her body and extremities, and to exercise moderately. Immediately before the menstrea began to flow, clysters of the same kind of medicines were injected.

jected. The courses were in sufficient quantity: But, as soon as they ceased, her belly increased in its circumference four inches and a half, but soon subsided: And then she complained of pains, which a gentle sweat carried off. Borborygmi were for the first time observed, on the same day, June 25th, and, having taken some *tinctura sacra* at night, she passed some blood next day by stool. This again was the first appearance made by the haemorrhoids, which she had been formerly subject to.

The two following days her saponaceous antihysterical and antiscorbutic medicines being still continued, she had such explosions of wind *αὐτὴ καὶ κατὰ*, that none of the other patients would remain in the same room, nay scarce on the same floor with her. Her belly became less, and softer than it had been from the first attack of the disease; her medicines, (with a dose of *syrup. de rhamno* at proper intervals) still were continued, (only the proportion of steel was increased), her flatulent discharge went successfully on; and, though for some time the swellings returned, she was strong enough to do the work of another servant of the Infirmary, who had fallen sick; and, having continued a considerable time in that station of servant to the hospital, she still used her medicines, till there had been no relapse for several months; since which she has been in very good health, notwithstanding her having gone from the Infirmary into service, where she wrought hard, fed indifferently, and commonly walked bare-footed.

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XXXII. *Colics for six Years, from a Concretion formed on a Plumb-stone lodged in the Guts; by Dr THOMAS SIMPSON, Professor of Medicine in the University of St Andrew's.*

A Girl about twelve years of age, who had been long troubled with colic pains, was last year under my management. She complained of pains fixed in one part about two inches below the short ribs of the left side, somewhat nearer to the back-bone than to the navel, where I was informed they had kept for at least three years; but for three years further back (in which they were confident she was subject to colics) they had not observed whether the pains were fixed to one particular part or not. As to the occasion of these pains, the child's relations told me, that sometimes she took them, when they could blame nothing, but that she never missed them some hours after eating pease, oranges, strawberries, or any other summer fruits, and upon taking any thing that was sour, or hard of digestion; all of which for the most part produced a loose belly, which carried the trouble off; but, if this did not happen, they were obliged to procure some stools by purges or clysters, which always succeeded till this attack of the disease, when I was consulted.

This fit, which was reckoned to have been occasioned by drinking small ale upon the turn, was accompanied with a violent constipation; and the pain was so violent, that she cried out in a most moving way, holding the

affected side as firm as she could with her hand. Her stomach was so squeemish, that she threw up every thing immediately after swallowing it. Her pulse was in the mean time of a natural strength and quickness, clysters had little effect on her; and though she got purgatives in different forms, and clysters were repeated some hours after, to solicit them downwards, yet they never were successful. Several other remedies were used at the same time, but all to no purpose. The pain and vomiting seldom left her for three weeks together; in which time, from the fatigue and want of sleep and nourishment, she was brought from a plump well-coloured girl, to have much the countenance of a skeleton.

After so many disappointments in my attempts to help her, and looking on her case as desperate, I was resolved to give her no more drugs; but, early in a morning, observing her to vomit a great deal of bile of a deep tincture, I began to suspect, that the abounding of such a sharp liquor might be the occasion of her trouble, and with that view desired she might drink down an English pint, or a pint and an half of tepid water, to provoke her to vomit, and to repeat this six or seven times. She immediately fell about the work; and, with some small intervals, went through her task, which proved a remedy to her, but in a different manner from what I expected; for, after she had vomited five or six times with the water, she had a demand to stool, which was copious; and in passing the fœces, she was sensible of something bulky and hard among them.

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(See tab. IV. fig. 3. and 4.)

This ball is, you see, of an irregular cubical shape, with a deep depression A (fig. 3.) in two of its sides that are opposite to each other; it was four inches in circumference, and weighed five drachms at first, though now it is much lighter: It seems to be compounded of threads matted together, and disposed into layers, (See fig. 4. which represents the two parts of it when it was cut through the middle.) In the middle of it, there is a plumb-stone B, the flat sides of which answer to the depressions in its external surface. C shews the cavity in which the convexity B of the plumb-stone was lodged.

I imagine the plumb-stone had been six years in my patient's body gathering the crust round it, and had occasioned the colics so long: In the persuasion of her disease depending on this preternatural ball, I made no scruple, when asked by the friends whether I thought she would be any more troubled with these colics, to give it as my opinion, that perhaps she might have some small relapses, till once the parts so long distended and compressed by the ball had recovered their natural state again, but that in a short time she would be quite free of them, since what I was confident was the cause was now removed; which has fallen out accordingly, she having had no fits these eight months except two; one she took pretty severely the tenth day after passing the ball, which was carried off by bathing and bleeding; a second she was seized with half a year after from cold, which went off without medicines: And all this

while she has ate every thing that comes in her way, particularly pease and oranges, which of all things brought formerly the fit most certainly upon her.

Additamentum Ann. 1746.

THE end of last year, I opened a brewer, who, for many years past had very little respite from severe colic pains, arising from the right side, above the haunch-bone; under them he would have been some weeks tossed together, sometimes with a perpetual vomiting and great feverishness, and though the open belly often relieved him, yet he had often a looseness with the pain, by which disorders he was much decayed in his strength, though originally a very strong man, and at length, under the severity of a long continuing fit, expired.

Upon opening him, I found the hard tumor, which I easily felt externally, and always had judged in the mesentery, to be in the caecum, which I slit quite cross, and yet had difficulty to extract from it two large tumors, one about the bigness of a goose and the other of an hen's egg, of the same substance with that in the preceding history, but more knobby; they lay in particular cells of that intestine, which with the parts about was very much inflamed: The lesser, when cut through, had nothing heterogeneous in it; the greater had a bit of the broad extremity of a sheep's rib, near the largeness of the nail of my fore-finger, and somewhat triangular, not far
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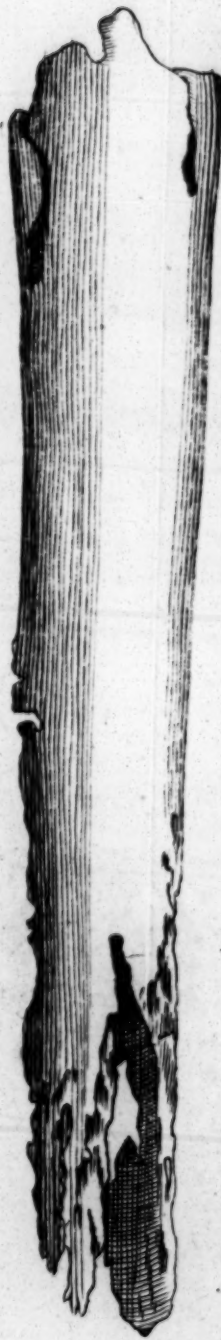
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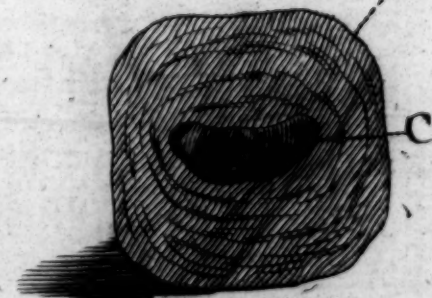
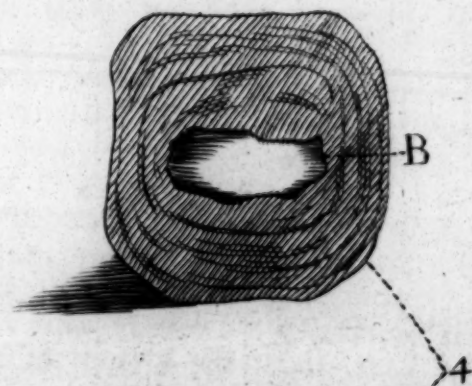
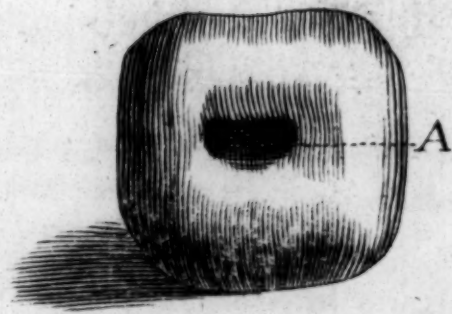
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from the most central part. Mr Spence surgeon in Dunkeld sent me one some years ago with a small cherry-stone in it, acquainting me that an old woman had passed five of them, about the bigness of walnuts, with one dose of physic. Mr Robertson surgeon in Crail, in the same way, brought severals from a patient, about the bigness of nutmegs, but none of them had any yolks, and were all of the same substance with what I have described, having seen severals of them cut up. I have forgot if these gentlemen had observed any symptoms in their patients which they had referred to these concretions: But the honour and credit of our profession requires that such causes lie before us, when judging of colics frequently returning and arising from the same place.

XXXIII. *An ESSAY on the Jaundice, by—*

WHERE theories are only applied to the resolution of some speculative question, it is of use to expose the false colouring; but where they are employed to explain the nature of diseases, and either immediately, or by very specious consequences, are introduced to influence the therapeutic part of physic, they ought to be thoroughly examined, that we may either have a valuable truth confirmed, or the world may be put out of the hazard of being seduced by a dangerous error: It is with a view of being serviceable this way that I propose to examine the causes of a very common disease, the JAUNDICE, which is treated of by
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the generality of systematic authors in physic, in a manner that is capable, in my opinion, of being attended with bad consequences.

One of the most frequent causes of a jaundice is said, by some authors of the greatest reputation, to be an obstruction of the extreme capillary vessels of the liver, and this obstruction may, according to them, depend on inflammation, schirrus, pituita, &c. I suspect, on the contrary, that no obstructions in the extreme branches of the hepatic blood-vessels is capable of producing this disease, unless in some particular cases where they may act as a remote cause; of which I shall have occasion to make mention afterwards.

I would found this negative proof on the nature of all the secreted liquors, which never appear in the compound mass of our fluids, but only begin to display their different properties after they are separated from the other juices by the discerning organs; and even then, they do not seem to partake of the qualities generally ascribed to them, and by which they are known, until they are farther prepared, and are thrown into some large canals where their quantity gives us an opportunity of examining them: If, after they are thus discerned and prepared, they are again mixed with the other liquors, without undergoing some new change in their composition, they do indeed evidently shew themselves by their effects. Since then the particles, fit for the composition of any of our liquors, cannot be said to enjoy the properties of such liquors, I cannot see why those that enter into the

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composition of bile should be supposed to produce the effect of bile, without having been ever separated. We see plainly on the stoppage of the secretions of other liquors, whose colour, smell, and taste, are capable of making us distinguish them, that they do not seem to shew themselves in their natural form any where else; thus, for instance, in an hydropic person, whose urine is suppressed by the compression or obstruction of the vessels of the kidneys, and whose belly and *tunica cellulosa* are thence greatly distended, we do not find that the waters, extravasated into these cavities, have the real marks of urine in them; nay, in the discharges of the skin and kidneys which are so succedaneous to each other, we cannot observe urine drilling through the skin, nor any thing like sweat in the liquor discharged from the bladder. From these and other such examples, I would imagine an obstruction of the blood-vessels of the liver, considered only as such, to be incapable of mixing bilious particles with the other fluids that are to circulate through the whole system of vessels; and therefore incapable of producing a jaundice.

But, seeing reasoning *a posteriori* is much more convincing in such matters than any other, I would next observe, that, if particles fit for composing bile were supposed capable of producing all the effects of bile, it would then necessarily follow, that, whenever such particles were sent in large quantities from the *vena portarum* into the *vena cava*, a jaundice would be formed; consequently this always would happen when any considerable obstruction

tion is made in the liver. Daily practice, and heaps of observations handed down to us, shew however, that violent inflammations and great abscesses have been in the liver, and that whole bowel has been schirrous, without any appearance of a jaundice. The examples are so numerous, I need not quote authors: See only Bonetus's collections. The conclusion, therefore, that necessarily follows from these facts, is in the negative to the allowing obstructions to be an immediate cause of the jaundice.

It may be alledged, that hitherto I have too abstractedly considered obstructions as a stop put to the passage of the liquors through the extreme vessels, whereas I ought to have had regard to the necessary consequences of such an obstruction, which it may be thought would solve all the phaenomena upon my own principles. These consequences are the distension of the obstructed canals, and the compression they must make upon the adjacent parts, among which there must be several that contain the bile that has been secreted, which will therefore be forced back again into the blood-vessels to occasion a jaundice.

That I may give my opinion distinctly on this subject, it will be necessary to consider the different parts of the liver where such an obstruction may be seated.

If the obstruction is made in the concave side of the liver, in parts situated near to the large biliary ducts, and if the swelling is very great, I shall allow it may stop the passage of the bile into the gut; and so may serve as a remote cause of the jaundice. I am not how-

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ever convinced, that this effect will follow from the compression of the hepatic ducts, unless the cystic bile is also prevented to flow into the duodenum : My grounds of doubting whether the hepatic bile can occasion this disease, are the following : Both by the taste of the liver at some distance from the gall-bladder, and by trials made of the hepatic bile when collected, we plainly find it to be a very mild liquor, with a very small proportion of the proper bilious particles. Next we see most of the drains of the body capable of transmitting bilious particles along with their other fluids : Thus the spittle of icteric people is bitter, and their urine, and sometimes their sweat, tinges linen yellow. Lastly, the quantity of bile constantly refunded to the mass of blood along with the finer parts of our food is considerable, and probably some of it has not its composition changed by the force of digestion ; yet there is no appearance of its mixture in a natural state. From these observations, one would be apt to suspect the bilious lymph of the liver to be capable of gradually mixing with the blood, without manifesting itself, especially since it can so quickly be sent out of the body by the excretories ; nay, tho' this should not happen, we can scarce suppose such a high colour, strong taste, and violent effects, so quickly produced by the hepatic bile, as is daily seen on the first discovery of the jaundice. To these arguments might be added the deficiency of proper observations or experiments to prove the jaundice produced without the cystic bile.

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When obstructions of any kind occasion a tumor, any considerable way within the liver near the branches of the *porus biliaris*, it may in part stop the course of the bile in these branches, from which it may be taken up by the ramifications of the *vena cava*: But the consequences of such bile will be of so much less effect towards creating a jaundice than in the foregoing supposition, as the quantity of bile hindered to flow to the common duct is less; and, in confirmation of this not being an adequate cause to produce this disease, we have numerous examples of tumors of all sorts observed in the liver upon dissection of bodies that had no icteric sign.

In respect of both the suppositions I have made, it is to be remarked, that a considerable tumor must be formed, before the sides of the biliary canals inclosed in their ligamentous sheath can be compressed sufficiently to have the effects which I have granted, and when the tumor is large enough, it must first straiten the branches of the *vena portarum*, which are larger than the contiguous biliary ducts; therefore, before these suffer, the quantity of bile secreted must be much diminished; if the lessening of this liquor is in the same proportion with the straitning of the vessels, the bile will pass; if the ducts cannot transmit all of it, the quantity interrupted will be but small, and its effects will be little.

The last supposition necessary to make, is the obstruction of the vessels remote from the larger biliary ducts, where the tubuli being small, a less distension of the obstructed canals will

will have greater effect on them. From what has been already said, it will seem at least necessary to suppose the obstruction pretty universal through the liver, in order to obtain such a consequence as is commonly disputed for. But then it is also obvious, that the obstructed vessels are the very canals that ought to supply the liquor which is to be secreted; and therefore the secretion will be prevented, which is also brought about by the compression which the tumefied vessels make on the small tubes from which the biliary canals rise, that is, on the secreting organs themselves. If then there is any truth in what I argued for, of unsecreted particles, which might prove proper enough materials for composing bile, not being capable of causing a jaundice, tho' they continue mixed with our mass of blood, it will follow, that neither on this third supposition will a jaundice be produced. Nor will it be amiss to support this reasoning, by repeating the mention of the many examples recorded of the liver being entirely schirrous or suppurated, without the person's ever having a jaundice.

This view of obstructions in different parts of the liver, give, I imagine, some reason to think such a cause unfit to produce a jaundice, whatever other bad effects such obstructions may have in disturbing the animal œconomy.

Whatever fate attends the doctrine of obstructions of the liver, must affect the practice of curing the jaundice; and, if this disease is so far from having obstructions for a frequent

cause that they cannot occasion it, then *de-obstruent, aperient, resolvent, &c.* medicines, and their different classes, adapted to the particular nature of the obstructing matter, will appear to be rather contrived for removing or mitigating some concomitant symptoms, and palliating some effects of the jaundice, than designed to make a radical cure of the distemper.

By what has been above hinted, it will be readily conceived, that the only cause I would argue for as capable to produce a jaundice, is the stopping of the bile in the *ductus communis cholidochus*, or in the cystic duct, and perhaps in the hepatic ducts of some few persons, whose hepatic bile is much stronger than it commonly is found.

Such an obstruction may depend on a great variety of causes, such as large tumors, or abscesses in the concave part of the liver, or in any other parts in the neighbourhood of the large ducts; violent inflammations, or other tumors in the coats of these ducts; the growing together of their sides; violent spasms in the duodenum, by poisons, or in hysteric disorders; very great inflammations and distensions of that gut, which often have the appearance of colics; and principally stones or concretions falling down from the gall-bladder.

Practical anatomists sufficiently shew, how frequently concretions are to be found here; scarce any of those who have handed down what they observed in dissecting human bodies, have omitted to give histories of this kind; only remark what a great variety are described

bed by Morgagni *: And, in another book, *Bonetus's Sepulchret. Anat.* we read a collection of numerous examples of this disease, the jaundice, proceeding from this cause, stones; and several of the greatest practisers in physic have taken notice of stones passing commonly, when the jaundice were going off. On these accounts it is surprising, so little regard is had now-a-days to these concretions, in the ætiology and cure of this disease, as to find them mentioned only *en passant* as a possible cause, without any directions to endeavour their expulsion in completing the cure, which I can only attribute to their being passed unobserved, because of the troublesome disagreeable office of searching for them.

Let us with all this consider, how exactly the falling down of a stone from the gall-bladder into the duct, explains all the phaenomena that commonly happen in the jaundice, which no other cause will do, and we shall have reason to look on concretions as a much more frequent cause of this disease than is generally thought. If a small stone falls into the duct, a considerable share of the bile may still pass; and, though the patient's urine becomes higher coloured, the skin remains untinged; the gall-bladder gradually is filled with bile, which gives a sense of weight in the right hypochonder; the secretion is diminished in the liver by the greater resistance now made to the evacuation of the bile; and the quantity of blood returned to the *vena cava* is greater,

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* *Epistol. adversar. Act. physico-medic.*

which makes a fulness in all the vessels of the body, giving the sense of fulness and lassitude, with an inclination to sleep. When a large enough quantity of bile regurgitates, the jaundice appears; and, according to the change of situation of the stone, the disease will have remissions or increase. If the concretion is so large as to press on the sides of the duct, it occasions pains about the lower part of the stomach. If the irritation it makes is great, the pains become more acute and lancinating, and, the stomach sympathizing as in the *calculus renum*, the patient vomits. If this irritation continues, the part where the stone sticks will be inflamed, and the neighbouring parts soon also come to be affected. By the inflammation and pain, a fever may be raised. When the stone obstructs the duct entirely, the excrements cannot be tinged yellow; nor will the intestines do their duty, because of the defect of bile, which, being reassumed into the mass of blood, tinges the urine, skin, eyes, &c. When the stone falls quickly into the duct and totally obstructs it, the person becomes suddenly icteric. If the stone is soon pushed forwards into the intestine, the disease is as soon removed by the passage of the bile being again free. If more stones succeed each other soon, the disease will appear to have had remissions. If there is any considerable interval between their falling down, so many periodical returns will be made of the disease. A diarrhoea often cures this disease, or rather a diarrhoea is the consequence of the cure; for, as soon as the concretion falls into the gut, the bile that was
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dammed up, follows in a great stream, and occasions the diarrhoea, at which time the stone or stones will be found among the fœces.

Concretions not only exactly thus account for the appearances of the jaundice, but by them only the effects of several plain antecedent causes can be understood. This disease, for example, has been brought on by violent anger, riding, reaching to vomit, fits of an ague, and several other convulsions or agitations of the body, which we cannot imagine to be any other reasonable way produced, than by a stone's being pushed down by these shocks of the body into the duct, from the gall-bladder, where it lay floating before. Which leads me naturally to think physicians frequently liable to be deceived, when they suppose spasms, inflammations, colics, acrid ingesta, &c. bringing on a jaundice, by the sole constriction of the biliary duct, without the help of any concretion; for in these cases either the causes could not be so permanent, *e. g.* the spasms would not continue so long as the disease does; or these causes seem not capable to bring on the disease so soon after their own appearance, such is the inflammation; and, if the disease was owing to several of the causes mentioned, it would not go off so soon as frequently it does. It is much easier therefore to conceive, how such forcible causes bring down a concretion, which proves the immediate cause of the disease.

If then stones are found most frequently to give rise to this disease, without the accession of any of these other causes, which I have ac-

counted capable of producing a jaundice; and, if these other causes are so well fitted for bringing down loose concretions, so often to be met with in the gall-bladder, it will follow that the first thing a physician ought to consider, when called to an icteric patient, is, whether any other cause manifestly shews itself without any indications of a stone, and, according to the particular nature of that morbid cause, he must prescribe; but, if either the symptoms of a stone's being engaged in the biliary passages are blended with the others, or, if there is not evident reason for not suspecting stones to have any share in occasioning the disease, which seldom will happen, particular regard is to be had to such concretions in the indications of cure.

I know it has been objected to the notion of bilious concretions so often producing a jaundice, that, in icteric bodies, no stones have been found in the ducts, tho' sought after; and, in other bodies, stones have been seen fixed in the ducts, without any preceding jaundice. To the former objection, it may be answered, that I have already allowed other causes to be capable of giving rise to this disease; and many cases can be supposed, where, tho' stones occasion it, yet we cannot expect they should be found. To name one instance among many, if an exhausted patient should die by the diarrhoea, which so frequently comes on when the concretions drop into the gut, it would be in vain to expect to find them. The other objection will as little prove what is intended by it, unless several other particular circumstances

stances are accurately observed ; as, for instance, if the stone was lodged in the duct long enough to occasion the disease, or if it has been only forced down by the agonies of death : If it is large enough, and so situated as to hinder the course of the bile, or if it still might allow this liquor to pass : If the liver is sound, and fit to seern good bile, or if it is otherwise diseased, and has either performed little or no secretion, or has separated a liquor different from bile. For, if these circumstances come out in the latter of the alternate ways I have proposed them, this observation will have no weight as an objection.

But to return to the method of cure, I have already given reasons why I think physicians are to act, in far the greater number of icteric cases, with a view to stones that are to be expelled ; and this will still appear more necessary upon reconsidering the other causes, several of which do not admit of a cure, or at most we can promise very little upon our success in treating them ; such are all large tumors, situated near the great biliary ducts, poisons, &c. If these therefore are cut off, and if most of the other causes do not distinguish themselves sufficiently from concretions, it will not be thought improper to affirm, that jaundice ought to be treated, rather more than can be said of any other disease, with one general indication of expelling stones ; and the spasms, inflammations, tumors, &c. are only to be looked on as so many concomitant symptoms, to which regard is indeed to be had in the management of the patient, while the main indication is to be

be pursued; and medicines are to be applied in very near the same form and intention as are used in cases of stones lodged in the ureters, which bear a very strong analogy to the subject which I have just now treated of.

The general doctrine of jaundice depending on concretions, was communicated to the gentleman who wrote the preceding essay, by Dr SIMSON Professor of Medicine in St. Andrew's, who, not chusing to adopt all his friend's reasoning, has transmitted to us the following essay on the same subject, which we hope will be likewise well received by the public.

XXXIV. *An ESSAY on the Jaundice; by Dr THOMAS SIMSON, Chandois Professor of Medicine in the University of St. Andrew's.*

TO give a right notion of the jaundice, I reckon it necessary to distinguish between a bilious colour appearing in the blood and tincturing the skin, which is not the product of the liver, nor of true bile regorging from the liver back into the blood, and giving its colour to the skin. Without this distinction, our history of the jaundice must be indistinct, as appears from many particulars.

I had occasion, in a treatise I have drawn up of the uterine diseases, to take notice of a phenomenon ordinarily appearing in infants, some of the first eight days after their birth, which our common people call the gum, and is often taken for a jaundice, from the deep yellow

yellow with which the skin is coloured, but in which I never saw the eyes tintured, and seems to arise from a strong tincture of the meconium drawn up into the blood, subtle enough to penetrate into the capillaries of the skin, but not into those of the coats of the eye, as the finer bile does, and disappears with the meconium.

It has likewise been found, that the bite of venomous animals has at once diffused a yellowness over the whole surface of the body: And Dr Tyson has, in the Philosophical Transactions, narrated an experiment made by an Indian in his presence, wherein blood turned immediately yellow mixed with a little of the humour expressed from the bags adjoined to the fangs of the *cobra de capelo*. And in the West-Indies, one of the malignant fevers is attended with an apparent jaundice, as happens sometimes in fevers here and other parts of Europe. A person dying in one of these was opened in Flanders by my friend Dr Pringle, who examined the liver particularly; but no stoppage to the bile was found about it; the *membrana adiposa* was found full of a yellow thin liquor, a quart of which was in the abdomen, and some small quantity in the thorax; and the gall-bladder contained a black inspissated glutinous liquor, which he reckoned Hippocrates would have called *black bile*. In vomiting under the disease, the person had cast up a very green kind of stuff. From all which the Doctor reckoned the appearance arose from a luxuriant bile produced under the disease, which was most malignant, though not one in twenty

twenty or thirty under it had the yellow colour: And, by Dr Tyfon's observation, we see how soon the whole blood may be turned into a kind of bile. Dr Bennet, in his third dissertation *de Phthifi*, shews how easily different colours arise in blood, as it is affected by different degrees of heat, &c. and amongst them the bilious; and Dr Pringle, in making experiments upon the blood, observes, that lime-water mixed with the cake, and exposed to a considerable degree of heat, produced a mixture like morbid bile, which, diluted with water, yielded the colour of green tea tinged with a little saffron: So that the blood is apt, under different circumstances, to assume the bilious colour. But, to confound these cases, where the skin is coloured from a change purely in the blood, or some adventitious colour mixing with it from some other source than the bile, with that where the colour arises from an actual mixture of bile with the blood, is to confound cases in our business which are essentially different; and therefore, in inquiring into the jaundice, it belongs to our profession to carry our views something farther than the skin and its colour.

The structure of the liver and observations of what passes in the body, direct us to be attentive to what passes in the intestines, to know if the bilious colour of the skin arises from the stoppage of the course of the bile or not; for, since the native course of the bile is by the common duct of the liver opening into the intestines, then we may persuade ourselves,

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selves, that, without some new cause to change this course, the bile must always be found at the intestines; and so in fact we find it, the dark yellow colour of what passes them being justly attributed to the bile, and the hard white excrement only taking place when the bile is deficient, which is most observable under the genuine jaundice, and indeed is the constituent symptom: So that if, at one and the same time, the skin and eyes are yellow, and the excrement white, one may be altogether certain of the passage of the bile being stopt into the intestines, and that it is thereby forced to regorge back into the blood: And, in this case, as the skin is coloured, so the urine is much impregnated with the bile which falls to the bottom in a very copious dark sediment; and, by comparing these symptoms with those attending the blood changed in itself, we shall find them most different, as must therefore be the cures; for, where blood is changed itself, the cure is only to be expected from curing these diseases by which it was changed, the fever, poison, &c. But the obstructed liver requires very different management, and the jaundice, which is its genuine offspring; and this is the only case I design here to treat of under the denomination of the jaundice.

As anatomy teaches us, that the common duct of the liver is the only place at which the whole of the bile can be intercepted, so dissections discover, that the largest tumors in the liver do not intercept the bile from it, or prevent its course to the intestines. I myself have observed the liver increased at least a
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third in its bulk, with a great collection of hydatical tumors in its most central parts, in a patient which never had the least appearance of the jaundice, tho' labouring for many years under great pain and sickness from this bad state of the liver; and instances every where occur of tumors of all kinds in that bowel without any prejudice that way, as may be seen in looking over Bonetus's collection. Nay, the *pori bilarii* often petrify in oxen without stopping the course of the bile, they still keeping tubular. And in general, under the largest swellings, if not bounded by rigid walls, as happens in the brain, the circulation still keeps up; nay, the vessels generally enlarge with them; so that the situation of tumors must be narrowly examined before we can determine that they affect particular vessels or secretions. I have seen myself a tumor as large as a walnut, quite round the common duct of the liver, and yet the passage rather more patent than ordinary; nor had the person ever any appearance of a jaundice that I could find. I don't refuse that the liver has often been found very diseased, accompanied with a jaundice; but I am more apt to look upon this as its effect than the cause, since I find in other cases the greatest disorders of that kind without any such thing; and the stopping the course of the bile must necessarily expose the liver to the greatest hazard of inflammation, suppuration, &c. as likewise the whole of the viscera, whose veins supply it, the common duct of the liver being a common excretory duct to them all; and therefore, from impeding the discharge

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charge of the bile by it, all the different viscera contributing to the *vena portarum*, must have the course of the blood in them retarded: Hence that oppression, weight, and laziness accompanying the true jaundice. Anatomy then must teach the judicious physician to examine what disorders in a person dying of the jaundice are to be looked on as the effects, and what as the cause, and not rashly advance every bad appearance promiscuously as causes. We have shown to what length the liver can be diseased without any regorging of the bile, and consequently without a jaundice; and some small reflexion would persuade us, that, if large tumors in the body of the liver, or inflammations, were to stop the course of the fluids through it, that they would rather hinder the secretion of the bile than make it regorge; for, after the secretion, it has already passed the greatest straits of the vessels, which are now still widening more and more. But such arguments *a priori* I trust little in theory, which ought chiefly to be built upon observations, which seem of no less weight to persuade us, that, in the gall-bladder of a number of people, there lurks a cause most effectual to produce the jaundice, when by any means it changes its seat to the common duct, than they are to satisfy us, that the largest tumors can exist in most parts of the liver without any such effect: The cause I mean is stones in the gall-bladder, which the moderns have found to be as common as stones in the kidneys, and consequently should be as much in our view in judging of the disorders of the liver and its

secretion, as the nephritic stones are in judging of such disorders in the kidney; and, if this had been done, we should not have been left to such doubtful management in that disease, which has been much in the hands of quacks, while, in the mean time, no disease affords more plain indications of cure. Fernelius is among the first, who, about two hundred years ago, took notice of these stones, as we find in Mathiolus's letters, who had been consulted by Cameniceus concerning them; and, since that time, there is nothing more commonly found in diseased bodies than numbers of such stones, from twenty to upwards of an hundred; but, in the gall-bladder, they lie as small stones in artificial gutters, and, being very smooth and soft, give no disturbance from irritation: But then, sneezing, coughing, vomiting, wrestling, jumping, convulsions, a sudden step, and every other thing, making a pressure on the liver, threatens to bring them down to the common duct, where, if they stop, a jaundice must ensue, of more or less continuance, according to their stay, and of a less or greater depth in colour, as the blood is more or less impregnated: Which considerations will easily account for all the phænomena in this disease, and the variety with which they appear, and the difference there happens in the cure, some disappearing immediately, and some after many days, while others are infallibly fatal; but these more rarely happen, since no stone can enter the common duct but what has a chance of passing; and when they enter, the action of the muscles of the abdomen and respiration

respiration urging them forward, must convince us, that the disease will often cure without any remedy, or under management with remedies nothing to the purpose, as do all diseases which depend on causes which yield of themselves, of which there are a great many: And thus the ignorant quack may be successful. By this view of things, we find how, from this hoard of stones being so often found in the gall-bladder, we are enabled to account for the frequency of the jaundice, the causes which are alledged to procure it, its having so many idle medicines devoted to it, its progress and different turns. And that, in fact, they are the immediate cause, what Fernelius observed gives the greatest assurance, who, in treating of the disorders of the gall-bladder, tells us, he found a stone which filled it quite up; and then adds, *Quinetiam post diuturnum icterum, oborto alvi profluvio, hujus naturæ innumeros calculos, instar pisi, aut hordei, in plerisque exturbariprehendimus*; and Baglivi, who had frequently met with these stones, as we find in his treatise *de Bile*, gives us a prognostic from them, *Si videris icteros sanatos, sed recidivos, eos certe a calculo vesicæ felleæ progigni prædicit*: But, why we should not judge of a single attack of the jaundice to come from the stones likewise, I cannot find, since there is no other cause we have so much reason to suspect: It is possible indeed that the common duct may be otherwise obstructed, as I observed in a person who died of a jaundice, and had his mesentery, pancreas, and part of the duodenum and jejunum quite schirrous, by which the duct was

quite abolished at its entry into the intestine; and others have given examples of its sides being grown together: But who would make allowances for these in forming indications of cure, since these cases are so very rare, and, when they happen, incurable? And thus it is, that, by a regular survey of the state of this disease and the circumstances of the liver, as inspection has detected them, we come to judge what are the ordinary and more plausible causes of this frequent disease; what have been erroneously suspected as causes; and what are the extraordinary causes which are little to be regarded in our indications of cure. I shall only further observe, that I have known, and at present know, several who have had a most luxuriant secretion of bile; so that they seldom missed of an uneasiness in the stomach, and violent head-ach once a fortnight by it, under which they would often vomit a pound or two of pure bile like the yolks of eggs, as they generally did upon taking a vomit; and yet none of these persons ever appeared with any thing of a jaundice, as we find in the history I gave of one of them in the fourth of my dissertations, where I described its consequences at large; so that I rather suspect the mass of blood to be changed, when the appearance of a general prevalency of the bilious colour is observed through the body, than a luxuriant secretion; if, at the same time, the signs of the common duct being obstructed do not manifest themselves.

And, thus we find, how anatomy duly attended to, not only leads to the best theory of diseases,

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diseases, but corrects what had taken place from a less accurate anatomical survey.

XXXV. *The Bladder become schirrous, from a singular Cause; by Dr EDWARD BARRY, Physician at Cork in Ireland.*

MR Moses Dean, a gentleman of a considerable family and fortune, naturally of a strong habit of body, and of a strictly temperate manner of living, while a child had often discharged gravel and small stones with his urine. The symptoms attending such a disorder increased as he grew older; and about the age of twenty-four he was cut on the gripe (as the lesser operation is commonly called) for the stone, and a very large one was taken out of his bladder. Soon after the wound in the perinæum was healed, he complained of a pain in that part, this was succeeded by a hard tumor, which gradually increased in a painful manner, for the space of twenty-one years, at which time it was so large, that it was equal to the size of a turkey egg, and prevented him from riding or sitting, but with great uneasiness. One day being in a chariot, he received a sudden jolt, which gave him such exquisite pain, that he sent for a surgeon, and told him that he was determined to have the tumor cut out, or opened immediately. The surgeon, though ignorant of the nature of the tumor, applied a caustic, and afterwards cutting on the eschar, a very hard resistance was perceived, which, by dilating the

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part, he found to proceed from a large stone about four inches and a half in length, and two and a half in breadth, contained between the bladder and the perinaeum. The stone had a small rising process which was fixed in the orifice of the bladder. After the stone was extracted, the urine constantly flowed out of that orifice, which always obliged him to keep a vessel or sponge to receive it, till the time of his death, which was seventeen years after this last operation.

During that time, several small stones passed through that orifice, which, with the acrimony of the urine perpetually running off, not only hindered him from sitting or riding, but made his whole life a constant scene of misery.

A year before he died, purulent matter frequently subsided in his urine; all the symptoms continued to increase, attended with bloody urine, a pain in the region of the kidneys, colics, and frequent vomiting.

On dissecting his body, at which several were present, his kidneys were found very large, with an unequal rough surface, owing to a great quantity of gravel collected in them. A large stone which could not pass the ureter was lodged in the pelvis of the right kidney, which was greatly dilated. In the left kidney, a large stone was found in a bed of corruption.

When the pelvis was examined, I was at a loss to find the bladder, nothing that bore the least resemblance to it appearing; and, in the place of it, a hard solid substance was discovered, which I concluded must have been the bladder,

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der, by the insertion of the ureters into it, which discharged the urine into the fistula.

This indurated scirrhus bladder had no cavity but what the small stream of urine kept open : it weighed thirteen ounces and a quarter. Cutting through it, the inside was white ; and it seemed to consist of several distinct scirrhus glands.

From the insertion of the ureters to the external orifice, was one continued fistulous cavity. The external margin of the perinæum was mortified, the inside of the fistula was ulcerated, and had large lateral sinuses, and that part of the indurated bladder through which the urine passed was cancerated.

It plainly appears, that this uncommon disorder was owing to the external orifice in the perinæum being healed after the operation, before the internal orifice in the bladder was united ; by which means the sandy sediment in the urine subsiding and pushing through it, formed a stone between that and the perinæum, which, for the space of twenty-one years, increased and dilated the adjacent parts, till they could not admit any further distention, and then the small rising process filled the orifice.

I never visited this gentleman till about two years before he died, and, by a cooling, opening, anodyne regimen, endeavoured to palliate the symptoms. This was all the relief his case would then admit of ; but, when the last stone was taken out, there were two different methods by which this preternatural alteration in the bladder might, I believe, have been prevented.

The

The first was by uniting the orifice in the neck of the bladder, by first reducing it to a green wound; but, as the lips of it must have been very callous, this might have been attended with great difficulty and danger.

The next was, by injecting through the orifice into the bladder morning and evening about a pound of any detergent injection, which by that means might have kept it pliable and free from obstructions, and given artificial motion, which might have supplied the defect of the natural one, and perhaps in some cases, where the habit of the body is disposed to form calculous concretions, it might be preferable to the former; for it is certain that a great number of stones did often pass through this orifice, which were too large to be discharged by the urethra, and which might otherwise have been more quickly fatal to him than this disorder, in which he miserably languished so many years.

XXXVI. *A Retention of the Seed in Coition, by*
WILLIAM COCKBURN, M. D. and Fellow
of the Royal Society.

A Noble Venetian, aged twenty-two years, was married to a very fine lady, with whom he cohabited with a good deal of vigour, but never could emit seed in the coition; whereas in his dreams he could discharge very freely. This misfortune very much afflicted him and his family; and, as no remedy could be found at home, the Venetian Ambassadors

factors residing in the different courts of Europe were desired to consult some of the most eminent physicians in the parts where they resided, to account for the causes, and to find out a cure for this extraordinary complaint of the difference of the states when in sleep, and when actually in coition.

I was of opinion it consisted altogether in the urethra, being closely shut up by vigour of the erection in coition, which formed so great a resistance, that the powers which throw the seed out of the *vesiculae seminales* could not overcome it; whereas in dreams, the pressure on the urethra being much less, an evacuation was made.

The method of cure was not less successful than obvious, from the foregoing account; for gentle evacuations, and a slender diet, brought about, and fully completed their desires.

XXXVII. *A Palsy of the inferior Extremities, with Mortification; by Dr JOHN DRUMMOND senior, late President of the Royal College of Physicians in Edinburgh.*

A Girl, ten years of age, having caught a great cold in the month of October 1705, complained next day of a pain and weakness of one of her legs, and the day following lost the use of both, when the pain ceased. Two weeks after, she was brought to Edinburgh, and put under the care of Dr Archibald Pitcairn, Dr Andrew Melvill, myself, and
Mr

Mr Alexander Monteith surgeon. We found she had lost all sensation and motion from the loins downwards, to such a degree, that she did not feel when pinched or pricked in these parts, and voided her excrements and urine involuntarily.

On the 9th of November, the following fomentation and ointment were ordered to be applied to her limbs.

℞ *Fol. rorismarin. salv. absinth. a mj. Flor. chamamel. sambuci a. pug. ii. Lign. guajac. unc. ii. M. coq. ex aq. calc. lib. viii. ad lib. vi. addendo tempore usus Sp. V. unc. iv.*

℞ *Ung. opodeld. unc. i. sem. Ol. ror. marin. chemic. drach. sem. Ol. absinth. chem. drach. ii.*

November 12th, some little pustules and blisters began to appear upon one of her legs, for which an ointment of *ung. alb.* made firm with cerusse was ordered.

15th, She took this purgative, ℞ *Syrup. violar. unc. sem. Tinctur. jallap. drach. sem.* but got not one stool by it, tho' about mid-day she had *Syrup de rhamn. unc. sem.* given her.

16th, Prescribed a purgative in this form,

℞ *Syrup. de rhamn. violar. a. unc. sem. Tinctur. jallap. scrup. ii.* But this did not in the least operate. At five o'clock in the evening, this clyster was injected. ℞ *Decoct. commun. pro clyster. unc. viii. Electuar. lenitiv. unc. sem. Vin. emet. drach. v.* But this she also retained till about nine, when a sharp suppository was introduced.

The

The blisters on her legs began then to be so big, that the fomentation and ointment could not be used. These blisters being cut with a pair of scissars, the skin below appeared black, but separated easily afterwards, and healed with *ung. alb.*

19th, The purgative was renewed, with addition of *tinctur. jallap. scrup. i.* but did not operate till a suppository was given at night.

23d, Her thighs and legs were sweated plentifully in a box, in which spirit of wine was burnt. This sweating was continued for some days, and then both her legs appeared covered with blisters; at the bottom of each of which, when cut, a black spot was observed, which separated by the suppuration in the same manner as the eschar of a caustic. The fordid ulcers remaining after these gangrenous crusts casting off, cured with the application of common digestive and *aq. calcis*, tho' frequently the bones were discovered by them; and, when they seemed to be near healed, a new gangrene discovered itself at some side of them.

December 4th, It was resolved to give her a few grains of calomel; and that evening she took *gr. iv.* in conserve of roses.

5th, The bolus was repeated, and in the night she purged a great deal of black foetid excrement.

9th, Her pulse felt very weak and languid; the purging still continuing, this julep was prescribed: *R. Aq. meliss. ceras. nigr. a. unc. ii. Cinam. f. v. drach. vi. Confect. alkerm. drach. sem. Laudan. liquid. gutt. xxv. Syrup. cariophyll.*

cariophyll. unc. i. M. Sumat cochleare ad libitum. At night she took *Mercur. d. gr. iii. Diascord. q. s. ut fiat bol.*

10th, A black spot, as large as half a crown, appeared upon the *os saerum*; it was hard as if made by burning, and turned the edge of the bistory with which it was scarified: When the scarifications were made on every side to the sound flesh, the mortification was found to reach as deep as the bone; it was dressed with tincture of myrrh and aloes, and common digestive to the sides.

11th, Notwithstanding the former dressing, the black mortification had spread half an inch on each side; after having scarified again all round the edges, it was dressed as formerly.

12th, The sphacelated parts began to separate from the sound, but another gangrenous spot appeared on the left hip, where the *os femoris* is articulated with the *ossa innominata*; this being scarified and dressed as the other, began to separate in two or three days.

15th, Another spot of the same nature, as broad as a crown, was observed on the under part of the left hip, one inch and an half distant from the podex, and stretched towards the pudenda: Another little gangrene was remarked at the same time upon the right haunch-bone.

All of them were scarified and treated after the same manner. When the gangrened parts entirely separated, the bone was always discovered in each of them, though these were the thickest muscular parts of the body.

All

All this time the patient purged incredible quantities of black most violently foetid faeces.

17th, She took this bolus, *℞ Limatur. mart. gr. v. Aquil. alb. gr. iii. Conserv. ros. q. s. ut fiat bol.* which was repeated on the 18th and 19th at night.

The ulcer which was made by the falling off of the first gangrene, and by which the *os sacrum* was discovered, began to appear clean, and the bone to be covered with flesh, when on the 23d a new mortification appeared on the lower edge of the ulcer, which, when separated, discovered a considerable share of the *os sacrum* and *coccygis*. At night, and on the 24th, the bolus last prescribed was given her.

25th, A vomit of *turbeth mineral gr. iv.* was given; it vomited her gently.

30th and 31st at night, the bolus of *aquil. alb.* and *limatur. chalyb.* was renewed.

2d January 1706, the *turbeth mineral* vomit was repeated.

4th, The cartilage which covers that part of the *os ischium* on which the tendon of the internal obturator muscle moves as on a pulley, separated and was brought away: So that, by the mortification on the lower part of the left hip, the *musculi obturatores, pyriformis, quadratus*, and *gemelli* were destroyed, and by the other on the joint of the thigh, the *glutæi* were also ruined.

After this, the patient's pulse was so weak, that we prescribed nothing except a weak decoction of *sarsaparilla*. Several new gangrenes appeared at the edges of the old ulcers, which separating, enlarging these ulcers so con-

siderably, that a man's whole hand might have been thrust into some of them.

10th, The *os coccygis* came out.

4th February, The great trochanter separated from the thigh-bone and dropped out; and the ligaments about the joint of the thigh being putrified, the head of the thigh-bone thrust itself out at the ulcer, and at every dressing it required to be reduced. She began now to purge fœces of the ordinary colour and smell; but, her pulse still becoming weaker, and her strength decaying, she died on the 21st of February.

During the whole course of her disease, she never complained of either pain or sickness, but diverted herself as other children use to do, and kept a good stomach, till about the middle of January, when she was considerably weakened.

From the beginning of December, till near the middle of February, she purged at least three or four pound of black very foetid matter every day.

All the month of February, her legs, thighs, and belly were œdematous and remarkably big.

XXXVIII. *An Account of the most remarkable Discoveries and Improvements in -Physic made or proposed since the Beginning of the Year 1731.*

MR William Houston surgeon has accurately described the plant of which the contrayerva is the root: The name he gives this plant

plant is *Dorstenia, dentariae radice, sphondylii folio*, of which there are two kinds, one *placenta ovali*, the other *placenta quadrangulati et undulata*. *Philosoph. Transact. Num. 421. § 2.*

Mr de Jussieu, physician and member of the academy of sciences at Paris, assures, from his experience of the successful effects in dysenteries of a thick yellow bark, which has an astringent gently bitter taste, brought first into Europe from America in 1713, called there *simarouba*, and resembling what is described by the ancients under the name of *macer*. Mr de Jussieu observed, that this medicine was more successfully given in decoction than in substance. The dose he usually gave was the third part of a chopin of decoction, which had two drachms of the bark in it. *Memoires de l'Acad. des Sciences, 1729.*

An accident of two women dying suddenly in Dublin, after drinking some of the common distilled laurel-water, gave rise to several experiments made upon dogs with the distilled water, and with the infusion of the leaves of this *lauro-cerasus*, communicated by Dr Madden physician at Dublin to the royal society in England, and afterwards repeated and confirmed by Dr Mortimer, R. S. S.; by which it appeared, that both the water and infusion brought on convulsions, palsy, and death, when taken by the mouth or anus. *Philos. Transact. Num. 418. § 7. and Num. 420. § 3.*

We are informed from Leyden, that Dr Gaubius, who has succeeded Dr Boerhaave in teaching chymy, gave, in the beginning of 1731, a public college on milk; in which he shew-

ed a great variety of experiments, and, among the rest, prepared its essential salt, by boiling whey (*serum lactis*) to one half, then filtrating it, he continued the boiling and filtrating till it became of the consistence of a syrup, when it was put into a cellar to crystallize, and there the salt formed into a cake, which was of a saccharous taste, and resembled manna.

Not. This preparation is somewhat different from that which Valentini * alledges to be the famous *saccharum lactis*, so much cried up by the first preparer of it *Ludovicus Testi* †, and recommended by others as an infallible cure of the gout.

The new experiments related by Dr Stahl, in his book of *chymical and physical Experiments*, are too numerous for us to enter upon an account of them, and most of them relate more to physics than medicine.

Dr Christ. Jac. Trew of Norimberg prefers the rectified spirit of grain for preserving anatomical preparations in, to spirit of wine, or compositions of alcohol, succinum, camphor, &c. because these, he says, soon change into a brown colour, whereas the spirit from malt preserves its limpid appearance. When any part is designed to be preserved wet, he recommends the washing of it with water, till the water is no more tinctured with any blood; the water is next to be washed away with spirits, and then the preparation is to be put among the spirits in the glass where it is to be kept;

* *Medicina nov. antiq.*

† *In epistol.*

kept; the mouth of which is to be very close covered with the glass head, over which a wet bladder and leaf-tin are tied. *Commerc. literar. Norimberg. 1731. semest. 1. specim. ix.*

We learn by private letters from Leyden, that the vessels of the crystalline humour of the eye, said in our public newspapers last year to have been discovered by Dr Albinus professor of anatomy there, are all the branches of an artery, which being sent off from the artery that enters at the central part of the retina, passes through the vitrous humour, and when it reaches the crystalline, disperses its branches along the surface of that lens like radii, till they are exceedingly minute, when they pierce into its substance.

Dr Albrecht, professor of medicine at Erford, in his anatomical observations of two men he dissected, is of opinion that the bladder of a strong man may be divided into six coats, among which he thinks the muscular ought not to be reckoned, because it consists of irregular separated bundles of fibres. He observed, that the part of a waxy injection coloured with cinnabar, which had made its way among the cellular membranes covering the coats of a vein, left the colouring powder behind it. After injecting wax into the left pulmonary vein, he remarked a vein filled with the injection, which ran up on the outside of the pleura to four or five inches distance from the vertebræ, and gave off branches to the neighbouring parts. By accounting for the phenomena of several diseases from this fact, he seems to think a communication between the pulmonary and thoracic

vessels always to obtain. *Albrechti observ. anat.*
§ 5. 8 11.

Jo. Henr. Schulze, professor of medicine at Altorff, having observed wax passing, as he thinks, through the coats of arteries and veins when these vessels were injected, of which that coloured with red lost its colour, while the green kept it, endeavours thence to account for the secretion of fat, and the production of an œdema. *Commerc. literar. Norimberg.* 1731, *semest.* 1. *specim.* v.

Mr Senac's new description of the structure of the diaphragm, and his remarks on the action of this muscle are so very particular and connected, that they will not bear such an abridgment as our design will allow.

Of the same kind are Mr Hunauld's observations on the structure and actions of some muscles of the fingers, and Mr Winslow's account of rotation, pronation, supination, and other circular motions; wherefore we must refer all these three to the original papers in the *Memoires de l'acad. des sciences*, 1729.

Mr Monro, professor of anatomy here, has made so many additions to his *Osteology*, and *Treatise of the nerves*, which he has tacked to the new edition lately published, that we cannot enter into a detail of them.

Mr Winslow, in his *Exposition anatomique de la structure du corps humain*, has mended every where the common descriptions, and has added innumerable particulars that were not mentioned before him, which make any tolerable account of such improvements so much longer than our work can admit, that we can do

do no more than recommend this author to all who wish to have a very particular and genuine knowledge of the structure of the human body. He is indeed very short, and extremely reserved in explaining the functions and uses of the parts, except in his treatise on the muscles, where he shews prodigious varieties in the actions of these organs of motion, that never were so much as hinted before.

Dr Bryan Robertson of Dublin, in his *Treatise of the animal oeconomy*, has endeavoured to improve on Sir Isaac Newton's opinions concerning several parts of the animal oeconomy, and supports his reasoning by a number of experiments and geometrical calculs. He shews, *first*, the laws that obtain in the motion of fluids thro' cylindrical pipes, which serve as an introduction to his account of the motion of blood in the vessels.

Next, He argues for "muscular motion being performed by the vibrations of a very elastic æther, lodged in the nerves and membranes, investing the minute fibres of the muscles, excited by the power of the will, heat, wounds, the subtile and active particles of bodies, and other causes."

The *third* subject he treats of is respiration; in which he contends, "The life of animals is preserved by acid parts of the air mixing with the blood in the lungs, which parts dissolve or attenuate the blood, and preserve its heat, and by both these keep up the motion of the heart."

In the following section, he argues for digestion being owing to gentle heat and motion.

"By

“ By this heat and motion the texture of the
 “ nourishment is changed in the bodies of a-
 “ nimals.” And then, “ The constituent so-
 “ lid parts of animals, according to their se-
 “ veral natures, are endued with peculiar at-
 “ tractive powers of certain magnitudes, by
 “ which they draw out of the fluids moving
 “ through them like parts in certain quantities,
 “ and thereby preserve their forms and just mag-
 “ nitudes.”

Secretions, according to our author, are per-
 formed thus: “ The glands in the bodies of
 “ animals, according to their several natures
 “ and dispositions, are endued with peculiar at-
 “ tractive powers, by which they suck in vari-
 “ ous juices from the blood.”

In the *last* place, he shows the proportion of
 the discharges of human bodies, *viz.* of perspi-
 ration, urine, &c.

Mr Winslow, physician and member of the
 Royal Academy of Sciences at Paris, has pro-
 posed an improvement on the ordinary manner
 of reducing inguinal or crural herniæ, namely,
 to cause the patient to rest on his knees and
 elbows, while the surgeon is attempting to re-
 duce the bowels. *Le Dran observations chirur-
 giques, tom. 2. obs. 1. and Journal de Sçavans,*
 May 1732.

Mr Cheselden, surgeon at London, has made
 a considerable improvement on the lateral ope-
 ration for the stone. Instead of pressing his
 catheter backwards, he causes it to be support-
 ed as close to the junction of the *ossa pubis*
 as possible; and, after having made a large in-
 cision into the teguments, he presses the gut
 back-

backwards with the fore-finger of the left hand, and, having felt the furrow of the catheter with his finger, he introduces his knife with the edge directed forward and downwards upon the finger into the furrow, immediately above the superior part of the prostata; and, with the knife in the same situation, he cuts a small share of the side of the bladder, its sphincter, the side of the prostata, the ligament through which the small beginning of the urethra passes, and the bulbous part of the urethra. After this incision, the gorgeret is introduced upon the fore-finger, which has been kept in the wound all this time. The forceps is quickly introduced, and the stone is as quickly extracted. *Douglas's appendix to the history of the lateral operation.*

Mr Garengot, surgeon at Paris, has much enlarged his treatise of chirurgical operations, in the second edition lately published; the most considerable improvements in the practical way, that we remarked to be here added, are the following:

Tom. I. p. 298. Old age is an advantage in performing the operations for herniæ; because old peoples guts are not so liable to inflame or gangrene as those of young persons.

Ibid. p. 408. He recommends exercise to hydropic people, immediately before they are to be tapped, that the grosser particles in the water of their belly may be mixed with the thinner, and so may run out with them. And, if there is reason to suspect any such gross parts remaining after the operation, he advises the injection
of

of barley water to dilute them and bring them away.

Tom. II. p. 354. He describes a new way of performing the operation of the *fistula in ano*; it is this, having thrust a probe through the gut, a little higher than the bottom of the sinus, and having drawn out that end by the anus, with the finger introduced into the gut, he makes an incision parallel to the probe, at an inch distance from it on each side, and cuts out all between the incisions.

Ibid. p. 431. A new method of tying a wounded intercostal artery, the invention of Mr Goulard surgeon at Montpelier, is described; the instrument employed is a semicircular or very curve needle, that has a groove along its convex part, and two holes at some distance from each other near the point, piercing from the convex to the concave side; this needle is fixed into a long straight handle, and a thread is put through the two holes in such a manner, that its noose is on the concave side, and the two ends are on the convex, in the groove of which they are hid and brought down to the handle. When the needle is thus mounted, an incision is made cross three ribs, that where the wounded artery is being the middlemost, when these are discovered, the needle is thrust through the intercostal muscles contiguous to the upper edge of that middle rib, and about an inch farther back than where the open orifice of the artery is, and is pushed within the internal surface of the ribs downwards, and made to pierce outwards again immediately below the under edge of the rib; as
soon

soon as the noose of the thread on the concave side of the needle appears without the muscles, it is to be raised with a pin, and the anterior end of the thread is to be drawn out; then the needle being drawn back again, brings out the other end with it; therefore the thread, being now round the rib, is to be tied firmly on it, and the artery will be compressed.

Tom. III. p. 187. In performing the trepan, he thinks it better for the surgeon to rest his chin in a ring made with the fingers of the hand that holds the handle of the instrument, than to rest his forehead on the back of that hand in the common way.

Ibid. p. 369. He thinks it is inconvenient for surgeons to press with the palm of their hand on the back of the amputation-knife in making the circular incision round a limb, but rather to make use of Mr La Peironyer's crotchet or hook at the point of the knife, into which a finger is put for directing the knife; or, if that is wanting, to take hold of the knife near its point with the thumb and fingers of the left hand.

Ibid. p. 423. He is of opinion that soft compression is much more effectual to stop hæmorrhagies than hard substances.

Ibid. p. 391. He condemns the use of vitriol buttons, even when stitches of arteries give way, and would rather trust to soft compression.

Ibid. p. 414. He advises the amputation of the fore-part of the foot when there is occasion; in doing which, the knowledge of the articulations there only can guide the operator.

The

The Chinese seem to have had the method of inoculating the small-pox, long before it was introduced into this western part of Europe: Their method of proceeding, according to Father d'Entrecolle's account, is this; they gather the scabs that come off from a healthy child that has had the small pox, in a favourable way, and keep them well shut up in a China cup till there is occasion for them; then taking four small ones, or two large ones, and putting a grain of musk between them, they roll them in a little cotton, and thrust this tent into the child's nose, where it remains till the symptoms of infection begin to appear. The child, on whom this inoculation is to be made, is to be more than a year old. If the pustules appear on the first day of the fever, the child almost certainly dies; if they come out on the second, the event is uncertain; if they do not show themselves till the third day, the patient probably will recover. *Lettres edifiantes & curieuses ecrites des missions etrangeres, par quelques missionnaires de la compagnie de Jesu, tom. 20. Paris 1731.*

D. Stevens, in his Essay on aliments, prefixed to his translation of Dolaeus on the gout, endeavours to prove the gouty humours to be rather of an alkaline than an acid nature, both from the nature of our fluids, and from the disease being most effectually mitigated or cured by an acefcient diet.

An anonymus author gives a long account of a colic, which generally prevails in Amsterdam during the winter, and destroyed many of the inhabitants in 1730. Its appearance is
very

very like to what was formerly called the *colic of Poiſſon*, and is here minutely deſcribed. The principal diſtinguiſhing marks of it being its obſtinacy, and bringing on convulſions, paſſies, and other diſorders that are commonly called *nervous*. The author redargues all the different opinions concerning the nature of this diſeaſe, and endeavours to prove it to depend on a gouty humour. *Bibliothèque raisonnée de l' Europe, tom. 8. art. 2.*

Dr Lobb, in his *Treatiſe on the Small-Pox*, ſeems to diſapprove entirely of bloodletting in the ſmall-pox; for the only caſe where he would allow of it, is in the beginning of the diſeaſe, in a patient who has a ſanguine plethora, which is again confined to ſo many circumſtances, that ſcarce ever ſuch a patient will be met with.

He thinks, with Dr Boerhaave, that the diſeaſe may be prevented or cured without any eruption, but differs from the learned profeſſor's opinion of this being done by the antiphlogiſtic method, and rather thinks a ſpecific may be found: He propoſes the æthiops mineral as a medicine that probably would prove ſuch a ſpecific, and relates ſome examples of the diſeaſe being, in his judgement, prevented by timely uſe of æthiops; but, before he would recommend it to general practice, he propoſes to have ſufficient trials of its effects made on malefactor, and lays down all the regimen neceſſary to be obſerved during the trials.

If Dr Lobb diſclaims blood-letting in the ſmall-pox, Dr Locher, profeſſor of medicine at Jena, in his *Sure rules to a ſucceſſful cure of*

the small-pox, recommends repeated and plentiful bleeding, and the greatest care to follow out the antiphlogistic method.

XXXIX. *A List of Medical Books published since the beginning of 1731.*

JOH. Jac. Mangeti *Bibliotheca Scriptorum Medicorum*, tom. 1. pars 1. 2. tom. 2. pars 1. 2. fol. Genev. 1731.

M. Frid. Ottonis Menckenii *Lipsiensis de vita, moribus, scriptis, meritisque* Hieronomi Fracastorii *Veronensis Commentatio*, 4to, Lipsiæ 1731.

Hermanni Boerhaave *Sermo Academicus de honore Medici, Servitute*, 4to, Lugduni Batav. 1731.

An Essay concerning the Nature of Aliments, and the Choice of them, according to the different Constitutions of human Bodies. In which the different effects, advantages, and disadvantages of animal and vegetable diet, are explained, by John Arbuthnot, M. D. Fellow of the College of Physicians and Royal Society, 8vo, London 1731.

Practical Rules of Diet, in the various constitutions and diseases of human bodies, by the same Author, 8vo, London 1732.

Joan. Philip Breynii, M. D. &c. *Historia naturalis Cocci Radicum Tinctorii, quod Polonicum vulgo audit*, 4to, Gedani 1731.

Prælectiones Pharmaco-mathicæ & Medico-practicæ; or, *Lectures on the Rationale of Medicines*, by Edward Strother, M. D. in 2 vols, 8vo, London 1731.

Cynosura

Cynofura materia medica continuatio secunda ad cynofura materia medica Hermaniana intentionem conscripta, publica luci exposita a Joh. Boeclero, M. D. & apud Argentinenfes Pr. P. 4to, Argentor. 1731.

Codex medicamentarius, seu pharmacopœia Parisiensis, ex mandato facultatis medicinae Parisiensis in lucem edita, M. Hyacintho Theodoro Baron decano, 4to, Paris 1732.

Institutiones chirurgicae; or principles of surgery, comprehending and explaining the general intentions of all the principal branches of that science; by G. Smith of Kendal, apothecary and surgeon, 8vo, London 1732.

Helmontius Ecstaticus, sive visa medicaminum potestas ab Helmontio somniant, revisa a vigilante Jo. Henr. Cohaeften. M. D. 8vo, Amstelod. 1731.

Geo. Ernesti Stahl's experimenta, observationes, animadversiones ccc numero chymicae & physicae, &c. 8vo, Berolini 1731.

Hermanni Boerhaave elementa chymiae quae anniversario labore docuit in publicis privatisque scholis, in 2 tom. 4to, Lugdun. Batav. 1732.

Nouvelle osteologie, ou description exacte des os du corps humain, accompagnée des remarques chirurgicales sur le traitement de leurs maladies, & enrichie de figures en taillédouce, par Jean Palfyn, démonstrateur en chirurgie à Ghent, 12mo, Paris 1731.

Osteologie, ou traite des os, par Jean Baget maitre-chirurgien à Paris, 12mo, 1731.

The anatomy of the human bones; to which are added, an anatomical treatise of the nerves; an account of the reciprocal motions of the heart,

heart, and a description of the human lacteal sac and duct, by *Alexander Monro* professor of anatomy, &c. the second edition, corrected and enlarged, 8vo, Edinburgh 1732.

Joh. Wilh. Albrechti, M. D. & Pr. *observationes anatomicae circa duo cadavera masculina*, 4to, Erfurti 1732.

Embryologia historico-medica, hoc est, infantis consideratio physico-medico-forensis, qua ejusdem nutritio, formatio, &c. exhibenter, a D. Martino Schurigio physico Dresdensi, 4to, Dresdae 1731.

Laurentii Heisteri Professoris publici Helmstaedensis, &c. *compendium anatomicum*. Editio quarta, prioribus longe auctior atque emendatior, in 2 tom. 8vo, Norimberg. & Alterf. 1732.

Exposition anatomique de la structure du corps humain, par Jaques-Benigne Winslow docteur en médecine, &c. 4to, or in 5 tom. 12mo, Paris 1732.

Henr. Bassii *observationes anatomicae & chirurgico-medicae*, in quatuor decades digestae, variis observatis rarioribus exornatae, & solidis medicae scientiae principiis superstructae, cum fig. 8vo, Halae 1731.

Dissertationes physico-mathematicae, partim antea editae in actis philosoph Londin. jam auctiores & emendatiores, partim nunc primum impressae, auctore Jacobo Juryn, M. D. Londin. 1732.

A treatise on the animal œconomy, by Bryan Roberson, M. D. 8vo, Dublin 1732.

An appendix to the history of the lateral operation for the stone, containing Mr Cheselden's present manner of performing it, by Dr James Douglas, 4to, London 1731.

Ob-

Observationes chirurgicae de calculo renum vesicae, urethrae, lithotomia, vesicae punctura, in quibus lithotomiae methodum quam celeberrimus Jo. Jac. Ravius Anat. P. exercuit tutissimam et felicissimam omnium hucusque inventarum methodorum esse variis experimentis et rationibus probat Jacob. Denys, chirurgus Leydensis, &c. 8vo, Lugd. Batav. 1732.

Parallele des différentes manieres de tirer la pierre hors de la vessie, par Henry Francois le Dran, chirurgien à Paris, &c. 12mo, à Paris 1731.

Observations de chirurgie auxquelles on a joint plusieurs réflexions en faveur des étudiants, par Hen. Franc. le Dran, à Paris 1731.

De gezuiverde Heelkonst, ter onderwyzinge van den Leerende en konst oefenenden Heelmeeſter door Joh. de Gorter, M. D. P. 8vo, tot Leyden 1731.

Traité des opérations de chirurgie, par René-Jacques Croissant de Garengéot, chirurgien à Paris, &c. in 3 tom. 12mo, 1731.

Lettre écrite au Sieur René-Jacques Croissant Garengéot, maitres des artes de Bourges, &c. au sujet de la nouvelle édition de son traité des opérations de chirurgie, 12mo, à Paris 1731.

Dissertationes medico-chirurgicae juxta circulationis leges, autore Hugone Gourraigne, M. D. & Pr. 8vo, Montpellier 1731.

Conspectus chirurgiae & medicinae, methodo Stahlianâ conscriptus, autore J. Junkero, M. P. P. Halæ 1731.

Institutiones medicinae theoreticae physiologiam & pathologiam complectentes, autore Antonio Deidier, M. D. chemiæ Pr. Montpelienſi, &c. 12mo, Paris 1731.

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Elementorum medicinae physico-mathematicorum, tom. I. autore Jo. Fred. Schreiber Regiomont. no. 8vo, Francofurti & Lipsiae 1731.

Christ. Godofr. Stenzelii, M. D. in academia Vitembergensi *Pr. medicina theoretico-practica aphorismis in usum auditorum suorum comprehensa*, 8vo, Francofurti & Lipsiae 1732.

Medicinae compendium in usum exercitationis domesticae digestum, cui accedit, 1. *Oratio de praxis medicae repurgatae certitudine*. 2. *Oratio de animi & corporis consensione mirabili in secunda quam adversa valetudine*, autore Johanne de Gorter, M. D. & Prof. 4to, Lugdun. Batav. 1731.

Hygieine sive tutrix corporis humani, modum ostendens quo homines absque medicamentis aetatem suam in statu naturali sano ac vegeto in seram usque senectutem protrahere valeant, tam ex veterum ac neotericorum auctoritate quam ex propria animadversione desumpta, à Jo. Franc. Paulo Ganser, Phil. & M. D. Lipsiae 1731.

Roberti Welsted tentamen de variis hominum naturis remediisque ad singulas accommodandis, ubi morbi earum sive simplicium, sive mixtarum affines notantur, ex quibus nata symptomatum diversitas exploratur, ipsaeque sanandi rationes deducuntur, 8vo, Londin. 1731.

Febrium continuarum quae anno 1729 Vratislaviae grassatae sunt recensio, occasione Cattarrhi febrilis per Europam epidemici adornata, à Jo. Gothofr. Hahn Phil. & Med. D. accedit dissertatio de aeris inspirati in pulmones effectu, 4to, Vratislaviae & Lipsiae 1731.

Archeus febrium faber & medicus, sive exercitatio medico-practica de usu & methodo rationali solida,

solida, certa, et secura, tam in febribus intermittentibus quam periodicis continuis administrandi febrifugorum omnium maximum corticem Peruvianum seu Chinam, autore J. Henr. Cohausen, M. D. 8vo, Amstelod. 1731.

A vindication of a late essay on the transmutation of blood, containing the true manner of the digestion of our aliments, and the ætiology, or an account of the immediate cause of putrid fevers or agues: As also, observations upon the noble specific *cortex peruvianus*. To which is added, by way of appendix, a dissertation concerning the manner of the operation of chalybeate waters, in opposition to the received opinion of their operating by their pondus, &c. founded upon experimental observations, and demonstrable principles, by *Thomas Knight*, M. D. 8vo, London 1731.

Observations in physic, both rational and practical, with a treatise of the small-pox, by *Thomas Apperly*, M. D. 8vo, London 1731.

A treatise of the small-pox in two parts, by *Theophilus Lobb*, M. D. 8vo, London 1732.

Remedio alle catarrali molestie, ed in conseguenza a qualsi voglia infiammazione, ed a qualunque altra malattia derivante, &c. di Sebastiano Rotano, 4to, in Verona 1731.

A mechanical dissertation on the *lues venerea*, proving the certainty of curing that disease without salivation, by *J. S. surgeon* 8vo, London 1732.

Doleus upon the cure of the gout by milk-diet; to which is prefixed an essay upon diet, by *William Stephens*, M. D. F. R. S. 8vo, London 1732.

Aretæ

Aretæi Cappadocis opera, cum commentariis integris Petri Petit Parisiensis, atque clarissimi Joannis Wiggani doctis & laboriosis notis, & celeberrimi Mattairii opusculis in eundem, tandemque eruditissimi Dan. Wilh. Trilleri observationibus & emendatis; editionem curavit Hermannus Boerhaave, fol. Lugdun. Batav. 1731.

Philosophical Transactions, giving some account of the present undertakings, studies, and labours of the ingenious in many considerable parts of Europe, for the year 1731, and some part of 1732, 4to, London.

Histoire de l'Académie royale des sciences année 1729, avec les mémoires de mathématique, et de physique, pour la même année, tirées des registres de cette académie, 4to, à Paris 1731.

Miscellanea physico-medico-mathematica Vratislaviensia, odor angenehme curieuse und nürliche Rachrichten, &c. anni 1727, trimest. 1. 2. 3. 4. Erford 1731, 4to.

Bononiensis scientiarum et artium academiae commentarium, tomus prior, 4to, Bononiæ 1731.

Actorum medicorum Berolinensium in incrementum artis et scientiarum collectorum, Dec. 3. tom. 1. 8vo, Berolin. 1731.

Commercium literarium ad rei medicæ et scientiæ naturalis incrementum institutum, quod quicquid novissime observatum, agitaturn, scriptum, vel peractum est, succincte dilucideque exponitur, anni 1731, semest. 1. 2. 4to, Norimberg 1731.

—Anni 1732, semest. 1. *ibid.* 1732.

Dissertationes medicæ quas ex auctoritate amplissimi senatus academici Edinburgensis, et nobilissimæ in eadem academia facultatis medicæ decreto,

creto, pro gradu doctoratus, summisque in medicina honoribus et privilegiis ritè ac legitime consequendis, examini subjecerunt.

Jacobus Mallison Anglus, *De Pleuritide.*

Georgius Grieve Scotus, *De Secretione Bilis.*

Joannes Sutton Anglus, *De Rachitide.*

Joannes Jamieson Scotus, *De Infantum morbis ab infantia ortis.*

Samuel Kay Anglus, *De Nephritide.*

Jacobus Dalrymple Scotus, *De Tympania,*
1731.

Joannes Armstrong Scotus, *De Tabe purulenta.*

Robertus Paterfon Scotus, *De Scorbuto,* 1732.

XL. BOOKS promised, and proposed to be soon published.

THOMAS SHORT, M. D. has published proposals, and is taking in subscriptions for publishing *the natural, experimental, and medicinal history of the mineral waters of Yorkshire, Derbyshire, and Lincolnshire.*

In the press *Pharmacopœa Leovar densis sexa editio, revisa et emendata.*

Pharmacopœa Edinburgensis editio tertia, recognita et emendata, is now preparing for the press by the college of physicians here.

Mr Cheselden, surgeon to her Majesty, and to St Thomas's hospital, will, it is expected, publish his large osteology this ensuing winter.

Jo. Christoph. Bohlius, M. D. of Koningsberg, is said to be about to publish *Γαλάζια corporis animalis occasione experimenti Gedani de ductu thoracico capti.*

A prospectus is published of a work that is ready for the press in Suabia, under this title, *Summaria historia abortuum molarumque diversarum exclusarum.*

The *Academia Naturæ Curiosorum* in Germany have advertised their design of publishing soon the third volume of their *Acta Physico-medica.*

Jo. Phil. Burggrave junior, physician at Francfort on the Maine, has published a specimen of a *Lexicon medicum universale*, which he proposes to make compleat in six small volumes in folio, the price of each of which is to be half a ducat.

The Westeins and Smith, bookfellers in Amsterdam, are also about to publish, in two volumes 4to, a book under the same name of *Lexicon medicum universale*, composed by Theodorus Tronchin and Ludovicus de Neufville, M. D. D.

A private society at Nörimberg are preparing materials for correcting and enlarging greatly Merklin's *Lindenius renovatus*: They design not to hurry their work, and by that means to make it the more correct and compleat.

Edward Milward, M. D. has dispersed proposals for printing a beautiful edition of Alexander Trallianus's works, to consist of 200 sheets folio: The subscription price two guineas.

Francis Clifton, M. D. proposes to publish *Hippocrates's* works in three large volumes 4to, at two guineas subscription.

Dr Friend's works are now printing at London in one volume folio.

Dr Albinus, professor of anatomy at Leyden, is said to design the publication of a very exact

exact copy of Eustachius's tables, with an accurate explication of them. A good number of the plates are already finished, and he has been preparing the text these several years.

Mr Winslow, in the prefatory advertisement to his *Exposition anatomique*, proposes to publish 80 original copper-plates in folio, representing all the parts of the human body, with Latin and French explications.

Such a work is much wanted; therefore we are persuaded royal bounty or generous subscriptions will enable him to finish so useful an undertaking, that already is considerably advanced; otherwise the public is in hazard of making an irreparable loss; because he says very justly, "He foresees this work will be too great for a private man," "Surpassera les forces d'un particulier."

XLI. SOCIETIES lately formed for the Improvement of Physic.

A Chirurgical Academy is lately instituted by public authority at Paris; the members of which are not only to publish their own and correspondents observations and improvements, but are to give an account of all that is published in surgery, and to compose a compleat history of this art, by their extracts from all the authors ancient or modern who have wrote on this subject. This academy is also to propose a question in surgery every year; whoever gives the most satisfactory answer is to be rewarded with a golden medal of 200 livres value. The question proposed this first year

year is, *Why some tumors are to be extirpated, and others are only to be opened; what are the circumstances in both these ways of operating which make the cautery preferable to cutting; and what are the reasons of preference?*

Another society is also lately erected at Paris, under the protection of the Count of Clermont, and is named the *Academy of Arts*; by which it is proposed, that all arts are to be considerably promoted, both by the labours of the members of the academy, and by the assistance and encouragement given by them to others who propose any useful discoveries and improvements. Among the arts about which this academy is to be employed, several branches of medicine are comprehended.

The king of Sweden has founded a society at Upsal, much on the same footing with the Academy of Sciences at Paris.

It is talked in Germany, that the physicians at Stutgard design to publish their *Acta* in the same form as the Berlin Transactions are.

The Hungarian physicians are said to have entered into the resolution of forming themselves into a society, and of publishing their observations.

The End of the First Volume.

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